AD_____

Award Number: DAMD17-99-2-9006

TITLE: Prescribed Burn at Pine Bluff Arsenal

PRINCIPAL INVESTIGATOR: Lance Peacock

CONTRACTING ORGANIZATION: The Nature Conservancy
Little Rock, Arkansas 72205

REPORT DATE: March 2002

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 2002	Annual (15 Feb 01 - 14 Feb 02)

4. TITLE AND SUBTITLE
Prescribed Burn at Pine Bluff Arsenal

5. FUNDING NUMBERS
DAMD17-99-2-9006

6. AUTHOR(S)
Lance Peacock

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
The Nature Conservancy
Little Rock, Arkansas 72205

E-Mail: lpeacock@tnc.org

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 Words)***

Fire is an important ecological process in the southern United States. Many animal and plant species evolved in the presence of fire, and many vegetation types thrive best when burned. Fire-dependent biota are declining, because of fire suppression and landscape changes. Pine Bluff Arsenal has been working to restore pine savanna, a declining habitat, by reintroducing prescribed burns on part of the Arsenal. The report contains information on fire ecology, history and prescribed fire at Pine Bluff Arsenal.

14. SUBJECT TERMS
Fire ecology, prescribed burns, pine savanna restoration

15. NUMBER OF PAGES
140

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

Table of Contents

Appendix

Introduction

Fire is an important ecological process in the southern United States, and elsewhere in the country. Many animal and plant species evolved in the presence of fire, and many vegetation types are maintained by fire. In the past 75 years, with modern fire suppression efforts, as well expanding roads and development, fire is occurring much less frequently. Fire-dependent biota and communities are threatened and declining as a consequence. Pine Bluff Arsenal has been working to restore pine savanna, a habitat particularly in need of management, by re-introducing prescribed fire on parts of the Arsenal.

The following annual report describes the ecology and history of fire at PBA and lists specific biota and communities being restored by fire. Fire effects monitoring reports from 2001 and burn plans are also submitted.

Rationale for Fire Management at Pine Bluff Arsenal Pine Savanna Restoration Project

Site: Pine Bluff Arsenal Old Growth and Pine Savanna Restoration Areas: ~2500 acres.

Location: Sections 18, 22, and 24, R10W T5S; Sections 13 and 14, R10W T5S; Jefferson County, Arkansas.

Ownership: Department of Defense; TNC - Fire Management Contract.

Update: March 8, 2002; Lance Peacock and Scott Simon.

General Site Description:

The 15,000 acre Pine Bluff Arsenal landscape is a mix of arsenal facilities, urbanized areas, second growth upland forest (11,000 acres), old fields and rights-of-way maintained by mowing and fire, bayous with riparian forest, lakes, swamps, and ponds. The arsenal is located on the West Gulf Coastal Plain along the Arkansas River. The geologic formations are deep alluvial deposits composed of sand and silt with embedded clay and gravel layers and wind deposited loess. The landscape is generally flat with little relief except where small creeks and streams have formed deeply incised ravines as they penetrate steep (to 100% slopes) Arkansas River bluffs. The elevation ranges from 195 feet above msl at the Arkansas River to 240 feet above msl at the top of the Arkansas River bluff and to 340 feet above msl at the northwest corner of the base.

The arsenal contains most of the forest communities found on the West Gulf Coastal Plain except the most xeric. Hydric bald cypress strands, mesic riparian forests, mesic to dry pine-oak forests, seeps, grasslands, and dry oak woodlands are extant. Quality ranges from low to high with the bulk of the forested area of medium quality. Many sensitive plants and animals, as well as a wide diversity of common species find suitable habitat on the arsenal. PBA has an active wildlife and timber management program. Five sites on the arsenal have been delineated due to their ecological quality and representativeness and three of these areas have a designated old growth forest components. Additional sites on PBA may be identified for biodiversity management due to continuing ecological assessment and biological inventory.

Refuge Woods: The Refuge woods comprise a spectrum of forest communities ranging from poorly drained hardwood bottoms to moderately well-drained pine-oak uplands. The bottoms are relatively open oak, hickory, sweetgum forests with scattered loblolly pine, and bald cypress in depressions. The trees are tall (70'-80') with 2' dbh common. The understory is mostly deep duff and leaf litter. Small patches of cane, seeps with dense ferns, and vine tangles are extant. The soil is usually moist with standing water in the late winter and spring. In the better drained upland areas the pine component increases with more grasses and areas of thick vine tangles. The litter and duff layers contain pine needles, and are more volatile. Due to small pine beetle infestation, several areas have been heavily thinned and represent pine savanna with dense herbaceous layers. Large standing snags are extant. Two small draws that are brush hogged annually contain rattlesnake master (*Eryngium yuccifolium*) and its dependent rattlesnake master borer moth (*Papaipema eryngii*) an insect previously on the USFWS candidate list.
Eastwood Bayou: Eastwood Bayou comprises rich riparian forests and slopes along a stream that flows year round and adjacent dry upland oak-pine forests. Although the trees are not as tall or large as refuge woods the herbaceous layer is better developed with more grasses and forbs. The riparian understory contains scattered cane and seeps with ferns. The duff and litter (mostly oak leaves) layer is deep. The uplands are drier with a higher component of pine needles in the litter layer. Vine tangles and woody debris are extant. Several rare plants are known from Eastwood bayou. Much of this site contains munitions storage bunkers.

Triplets Bluff-Phillips Creek: This site contains the driest uplands on the base, as well as a deep ravine with a rich bottomland and slope forests of cherrybark oak and bald cypress. Philips Creek is a perennial stream with a elm-ash-sugarberry canopy over a rich plant community. The riparian area is often dense

with cane and vines. The trees are large and the soils moist. The uplands are mesic to dry oak and oak-pine forests and woodlands. The trees in the uplands are relatively short (50' or less) and small (dbh 18"). Scattered grasses form the herbaceous layer with a mostly oak leaf litter. The duff layer is moderately deep. Several rare plants and the highest quality plant communities are located at this site. Much of this site is in a designated dudded area.

Yellow Lake: (see TNC 1997) Not a fire maintained site.

Railroad Grassland: The railroad grassland is a long strip of grass dominated vegetation along the railroad right-of-way. The grassland is dominated by little bluestem, velvet panic grass, and a wide diversity of the forbs and grasses. Several rare plants are known from the railroad grassland. In places the site has become shrubby with small tress

Elements Of Conservation Concern:

The following list is composed of plant communities and plant and animal species of conservation concern known from the Pine Bluff Arsenal. Not all plant communities and plant and animal species are known from the old growth areas. Recent biological inventories uncovered many species of insects that had not been recorded from Arkansas. Several are considered rare but have not been ranked and are not included in the following table.

Plant communities:		
mixed overstory-*Arundinaria gigantea* Riparian	Forestforested canebrake	G2S S1
mixed overstory-*Acer rubrum* var. *trilobum*-fern Forest	coastal plain seeps	G4 S2S3
Pinus echinata-Quercus (stellata-falcata) Woodland	dry shortleaf pine-oak woodland	G4 S4
Pinus (taeda-echinata)-Quercus (velutina-falcata-alba) Forest	submesic pine-oak forest	G3 S1
Pinus taeda - Quercus (nigra-alba) Forest	lowland pine-oak forest	G2 S1
Pinus taeda Savanna	pine savanna	G3 S1
Quercus lyrata Forest	overcup oak forest	G4 S3
Quercus (nigra-alba) - Carya cordiformis Forest	mesic oak forest	G4 S4
Quercus (pagoda-alba) - Liquidambar styraciflua Forest	lowland oak-sweetgum forest	G3G4 S1
Quercus phellos Forest	willow oak forest	G3 S2
Quercus stellata-Quercus (velutina-marilandica) Woodland	dry oak woodland	G3 S2
Schizachyrium scoparium-Panicum anceps Grassland	tallgrass prairie	G4 S4
Taxodium distichum Forest	bald cypress forested channel	G4 S3
Ulmus americana-Fraxinus pensylvanica-Celtis laevigata	Forestelm-ash-sugarberry forest	G5 S5
Plants:		
Carex atlantica subsp. *capillacea*	prickly bog sedge	G5T5 S2S3
Chamaelirium luteum	devil's bit	G5 S3
Eleocharis flavescens	pale spikesedge	G5 SU
Eleocharis microcarpa	small seeded spikesedge	G5 S2
Eupatorium hyssopifolium var. *hyssopifolium*	boneset	G5 S3
Lycopodium appressum	southern clubmoss	G5 S3
Scleria pauciflora	few flowered nutrush	G5 S3
Animals:		
Alligator mississippiensis	American alligator	G5 S3
Buteo lineatus	red-shouldered hawk	G5 S3

Haliaeetus leucocephalus	bald eagle	G4 S2
Ixobrychus exilis	least bittern	G5 S2
Lophodytes cucullatus	hooded merganser	G5 S2
Macroclemmys temmincki	alligator snapping turtle	G3 G4 SU
Papaipema eryngii	rattlesnake master borer moth	G1 S1
Regina grahamii	Graham's crayfish snake	G5 S2
Speyeria diana	diana fritillary	G3 S3
Tachycineta bicolor	tree swallow	G5 S4

Role and History of Fire:

Fire in the pine, pine-oak, and oak dominated forests of the southeastern United States has been well documented by Pyne (1982) and others. An examination of Arkansas Forestry Commission records indicates a prevalence of naturally (lightening) ignited fires occurring from mid-July through October in the Interior Highlands and Gulf Coastal Plain with a shorter fire season in March and April. Anthropogenic fire could occur in any season but early records of aboriginal burning reference September through December. Periodic fire is essential to maintaining open forest structure and composition, as well as the herbaceous vegetation in pine, oak-pine, and oak forests and woodlands and associated grassland ecosystems of the Gulf Coastal Plain uplands. Fire also plays a role in maintaining open wetland and oak-dominated bottomland forest communities

Examination of GLO records of the site indicate a forest composition similar to today's but with a more open forest structure. Fire history reconstruction in the Ouachita Mountains show a wide range in frequencies, spatial coverage, and seasonally depending on location, community type, and aspect. Pine, oak, and pine-oak communities on ridges and south slopes with grassy herbaceous layers burned in the range of 1 - 7 year intervals. While north slope and ravine forests burned at less frequent intervals. No fire reconstruction work has been done for Arkansas' Gulf Coastal Plain.

Past Management:

Previous to the establishment of the arsenal in 1941 the area was a mix of farms and forest. The area was cutover for timber before 1920. The flat areas were cultivated and steeper area used as woodlots and grazing for cattle and hogs. Abandoned fields grew up in pine or in some cases were planted in pine during the 1930's. The burning of farm stubble and woodlands was a common practice in Arkansas throughout this time period.

The establishment of the arsenal began a long history of timber and wildlife management under various management philosophies ranging from neglect to active manipulation. Fires were suppressed during much of this time period.

For the last 15-20 years prescribed fire has been used to prevent wildfires along the railroad right-of-way and under pine forests to control the understory and to improve wildfire habitat. Some prescribed burning is carried out every year at PBA. Prescribed forest fires have been relatively cool winter burns and are not usually used in hardwood stands to protect timber value. With the more recent emphasis on biodiversity and ecosystem management attempts are being made to more closely imitate fires that maintain and enhance forest structure and composition.

Goals of Fire Management:

1. The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA.

2. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types.

3. The restoration of pine savanna.

4. The maintenance and enhancement of fire-dependent rare species populations.

Constraints:

Possible logistical constraints include restricted access to some burn units, nearby munitions storage, dudded areas, smoke management, and base operations.

Damage from Fire:

None. Several rare plants, reptiles, birds, and insects are known from PBA. The species of concern are grassland remnant-dependent, fire-dependent, or fire-independent and are expected to increase or not be affected as fire is reintroduced.

Burn Units:

No permanent burn units are in place:

In 1999 three units were burned.

Refuge Woods: pond unit 185 acres. Completed 3/99.
Phillips Creek-Triplets Bluff (bombing mat): dud unit 103 acres. Completed 3/99.
Eastwood Bayou (CLA): bunker unit 98 acres. Completed 11/99

In 2000 one unit was burned and two units are scheduled.

Refuge woods: savanna unit 206 acres. Completed 3/00.
Yellow Lake: island unit – 75 acres.
Eastwood Bayou: pecan grove unit – 60 acres.

In 2001 four units were burned.

Yellow Lake, island unit – 75 acres. Completed 3/01.
Pine Savanna Restoration Area, hourglass unit – 36 acres. Completed3/01.
Pine Savanna Restoration Area, horseshoe lake unit – 127 acres. Completed 3/01.
Triplett's Bluff, nilo pond unit – 183 acres. Completed 3/01.

Burn Timing and Frequency:

Fire could burn in this landscape in any season. Most prescribed burning in Arkansas is carried out from September through April. Burning in any of these months is appropriate. Growing season (April - September) and pre/post drought burns have very beneficial effects in restoring ecosystem composition and structure.

Restoration burns are used to remove the heavy build up of litter and duff and reduce the density of woody stems in the smaller size classes. During the restoration phase short time intervals (annual to every 2 years) are desired, dependent on fuel conditions. During the maintenance phase longer time intervals may be desired.

Monitoring:

Post fire estimates of fire intensity (scorch height and class, char, understory burn severity, and litter consumption) will be taken. Permanent transacts with photo points will be established to monitor and measure tree densities and plant composition. Observations of rare species reaction to fire management will be noted. The reaction of the rattlesnake borer moth to the timing, frequency, and intensity of burns will be noted.

References:

Albert, Lois E. Five Thousand Years of Environmental Change in Southeastern Oklahoma. Okla. Arch. Sur., No. 7; 1981.

Campbell, J.J.N., et al. Floristic and Historical Evidence of Fire Maintained, Grassy Pine-oak Barrens before Settlement in Southeastern Kentucky. In Proc: Fire and the Environment: Ecological and Cultural Perspectives. SE For. Exp. Sta.; 1991.

Foti, Tom and Sue Glenn. The Ouachita Mountains Landscape at the Time of Settlement. In Proc.: Conference on Restoring Old Growth Forest in the Interior Highlands of Arkansas and Oklahoma. Winrock; 1990.

Guyette and McGinnes. Fire History in an Ozark Glade. In Proc.: Mo. Acad. Sci.; vol. 16; 1982.

Guyette, Richard P. and Bruce E. Cutter. Tree-ring Analysis of Fire History of a Post Oak Savanna in the Missouri Ozarks. Nat. Areas J., vol. 11, no. 2; 1991.

Johnson, Forest L. and Gary Schnell. Wildland Fire History and the Effects of Fire on Vegetative Communities at Hot Springs National Park, Arkansas. Rep. To: NPS; 1985.

Kreeter, Scott D. Dynamics and Spatial Patterns of a Virgin Old-growth Hardwood-pine Forest in the Ouachita Mountains, Oklahoma, from 1896-1994; 1994.

Ladd, Douglas. Reexamination of the Role of Fire in Missouri Oak Woodlands. In Proc: Oak Woods Management Workshop; 1991.

Masters, Ron E., et al. Preliminary Fire History of McCurtain County Wilderness Area and Implications for Red-cockaded Woodpecker Management; 1994.

Masters, Ron E., et al. Effects of Timber Harvest and Periodic Fire on Soil Chemical Properties in the Ouachita Mountains. So. J. App. For., Vol. 17, No. 3; 1993.

Pyne, S. L. Fire in America: A cultural history of wildland and rural fire. Princeton Univ. Press; 1982.

Pyne, S. L. World Fire: The culture of fire on earth. Univ. Wash. Press; 1995.

Robbins, Louise E., and Ronald L. Myres. Seasonal Effects of Prescribed Burning in Florida: A review. Tall Tmbrs. Res., Inc. Misc. Pub. No. 8; 1992

Rudis, Victor A. and Thomas V. Skinner. Fire's Importance in South Central U.S. Forests: distribution of fire evidence.

Skiles, Albert. Arkansas Climate Atlas. AR Energy Off.

TNC. Survey of Threatened and Endangered Plants, Vegetation and Natural Areas at Pine Bluff Arsenal; April 1997.

Whelan, Robert J. The Ecology of Fire. Cambridge Univ. Press; 1995.

Appendix

Fire Summary Reports and Controlled Burn Prescriptions

THE NATURE CONSERVANCY
FIRE SUMMARY REPORT AND POST BURN EVALUATION

SITE: Pine Bluff Arsenal.
UNIT: Island Unit – 75 acres.

DATE BURNED: 10 March 2001.
DATE EVALUATED: 28 March 2001.
REPORT BY: Mike Melnechuk and Douglas Zollner.

FIRE WEATHER FORECAST

Date:	10 March, 2001
Time:	0900
Humidity (low):	30%
Temperature (high):	62°F
Wind Speed:	7 mph
Wind Direction:	south
Sky:	clear

ON-SITE WEATHER

Time:	1625	1720
Location:	west line	west line
By:	C. Moscardelli	CM
Dry Bulb:	60°	58°
Wet Bulb:	47°	47°
Humidity:	34%	42%
Wind Speed:	0-6	0-6
Wind Direction:	SE	SE
Sky:	clear	clear
KBDI:	~200	

CREW

Mike Melnechuk - fire leader (rake and water).

Kevin Rehman – ignition boss (torch) with Nathan White – igniter (torch), Seth Young – igniter (torch), Cara Moscardelli - igniter (torch), Kevin Seaford - igniter (torch), and David Baker - igniter (torch).

Doug Sprouse – holding boss (rake and water) and Aric Journot – holding (rake and water)

IGNITION BEGAN:	1635, west line.
PERIMETER RUNG:	the unit is an island.
INTERIOR IGNITION COMPETED:	1835.
INTERIOR BURNOUT:	1835.

FIRE NARRATIVE

The burn unit is a 75 acre (FM8 and FM12) island in the Arkansas River. The firelines were installed about a month prior to the burn. The only line work that was necessary was a cut and raked handline connecting the west road to the bayou, 35'-long and 3'-wide down to mineral soil. The east, north, and south firelines were the Arkansas River. The west line was a 20'-wide gravel road at the northern ¼ of the line which was connected via a handline to a bayou which made up the rest of the line. The road section of the line was adjacent to a FM3 Johnson grass field and the bayou ran through FM8.

Melnechuk made all official notifications enroute to the site and a weather forecast from AFC at 0900. Both ARFO engines were staged at the northwest corner of the unit along the road. An ATV was staged with water and hand-tools along the road. No reserve water jugs were staged due to the unit being extremely secure and surrounded on all sides by water, with the exception of a 300 yard stretch of road and handline. Reserve drip torch fuel was staged at the ignition point.

The crew briefing was held at 1630 and a test fire was lit at an old skidder trail half way between the north end of the island and the handline. After 5 minutes of test fire, the wind and fire behavior was acceptable and the fire was pronounced a go. The igniters attempted to burn the FM8 with no success, then proceeded to burn the FM12 slash piles with greater success. There was an old log deck by the skidder trail with substantial fuel that burned very well, and fire started to move to the north, with high flame lengths and intensity, but slow rates of spread. The ignition team continued to ignite slash piles working their way south. Holding personnel patrolled the road watching for potential spotting in the Johnson grass field to the west. Sprouse and Melnechuk blacked-out the handline area using fusees, and then Sprouse burned out several patches of honeysuckle along the road with some success. After an hour of ignition, the igniters ran out of burnable fuels, and headed out of the unit back to the ignition point, with holding personnel continuing to patrol the road.

The crew monitored the fire for another one and a half hours, and the piles eventually burned out, with the spread of fire being halted to the north and south by flooded areas. No mop-up was necessary, and the crew departed the unit at 1900.

Headfire flame lengths in the FM12 averaged from 6' to 10' with some 15 flame lengths, but very slow rates of spread. Backfire flame lengths in the FM12 were between 2' and 5'. The FM8 for the most part did not ignite at all, and where it did it creeped with less than 3" flame lengths.

Notes

1. The bottoms and riverside forest along the Arkansas River burns mildly during dry periods when part of upland burn units. The fuels of this unit are mostly too sparse and very difficult to ignite independent of the uplands.

Immediate Post Burn Effects

Natural community	Bottomland hardwood and riverside forest, partially cut.
Unit coverage	14%
Burn severity organic substrate	2.4 (moderately burned)
Burn severity understory	3.0 (moderately burned)
Overstory char height class	n/a
Overstory char degree	n/a
Overstory scorch percent class	n/a
Overstory scorch height class	n/a

ECOLOGICAL OBJECTIVES

1. 50% unit coverage. The unit was 12% burned. The only areas of the unit to burn were cut-over and had large piles of downed woody debris or concentration of Japanese honeysuckle. The bulk of the unit could not be ignited.

2. Substrate burn severity class = 1.0 – 3.0. Substrate burn severity = 2.4. Where the downed woody debris and honeysuckle ignited, it usually burned to mineral soil.

3. Understory vegetation burn severity class = 1.0 – 3.0. understory vegetation near burning piles of downed woody debris was mostly consumed.

4. Overstory char height class = 0.5 – 1.5. The wooded areas of the unit did not ignite.

5. Overstory char degree = 0.5 – 1.5. The wooded areas of the unit did not ignite.

6. Overstory scorch percent class = 0.5 – 2.0. The wooded areas of the unit did not ignite.

7. Overstory scorch height class = 1.0 – 2.0. The wooded areas of the unit did not ignite.

Few ecological objectives were not met by this burn. From past experience the bottoms and riverside forest at PBA can burn in a mild manner when made part of burn units that contains extensive upland fuels. As the fire is ignited and burns through the uplands it will continue into the bottoms with decreasing intensity. The bottoms and riverside forests do not ignite and burn independently. The forest of the island unit is unlikely to burn except under severe weather conditions and after extended drought.

THE NATURE CONSERVANCY
FIRE SUMMARY REPORT AND POST BURN EVALUTION

Site: Pine Bluff Arsenal, Pine Savanna Restoration Area.
Unit: Horseshoe Lake Unit - 127 acres.

Date Burned: 23 March, 2001.
Date Evaluated: 30 March 2001.
Reported By: David Baker, Douglas Zollner, and Aric Journot.

Fire Weather forecast

Date:	23 March 2001
Time:	1000
Humidity (low):	45%
Temperature (high):	72°
Wind speed:	5 mph
Wind direction:	East
Sky:	partly cloudy
KBDI:	200
Comments:	cold front tonight with wind shift.

On-site Weather

Time:	1038	1110	1155	1325	1435	1505
Location:	NW corner	NW corner	NW corner	NW corner	mid-eastline	NE corner
By:	N. White	NW	NW	NW	NW	NW
Dry bulb:	66°	67°	69°	74°	72°	72°
Wet blub:	55°	56°	57°	61°	59°	59°
Dew point:	46°	47°	50°	52°	50°	51°
Humidity:	49%	49%	51%	47%	45%	45%
Wind speed:	1-3 mph	0-4 mph	0-4 mph	0-2 mph	0	0
Wind direction:	E	80°-140°	80°-140°	80°-140°		
Sky:	mstly clr	mstly clr	mstly clr	mstly clr	mstly clr	mstly clr

Crew

On-crew: David Baker - Fire Leader (water and rake) with Douglas Zollner - igniter (torch and water), Kevin Seaford – 2nd water (water and rake), and Nathan White - drag (ATV w/water, rake, pulaski, drip touch).

Off-crew: Aric Journot- crew boss (water and rake) with Mike Melnechuk - igniter (torch), Seth Young – 2nd water (ATV w/water, rake, pilaski, flapper, and drip torch), and Cara Moscardelli - drag (ARFO Chevy pumper w/water, rake, flapper, pulaski).

Ignition begun:	12:15.
Perimeter rung:	14:20.
Interior ignition complete:	15:00.
Interior burnout:	16:00 (surface fire).

Fire Narrative

The crew had prepared the lines several weeks prior to the fire. On the day of the burn all lines were reblown to ensure line security. Baker patrolled the north and east lines the morning of the burn, and raked around snags that had accumulated litter around the bases. The north line is a preexisting logging road 12' wide, adjacent to FM2 and FM9 and with logging slash scattered along the line. The west line is Atkinson road, 30' wide with 20' of mowed grass on both sides of the road. West side of the road is a railroad track and west of the railroad track is a small area of FM9. The east line is a continuation of the northern logging road. On the unit side of the east line there is a row of slash piles. The logging road leads out to McCoy road. The east line runs into Tulley Lake. The southern line is Lake Tulley and the creeks leading into the lake. A power line merges into Tulley Creek on the western edge of the southern line. The total amount of crew time spent prepping the lines was one hour the day of the burn and several hours prior to the attempted burn early in the month.

Water was obtained from the PBA hydrant at the base Fire Station two hours prior to ignition. The TNC 250 gallon pumper (Duelly) was staged at the east corner with flapper, council rake, Pulaski, and drip torch fuel. Another engine, the 200 gallon engine was staged with flapper, council rake, pulaski, drip torch and drip torch fuel. Two ATV's were staged with drip touch, flapper, council rake, and pulaski. On the western fire line there was two staging areas with drip torch fuel, 5 gallons water, flapper and a council rake. On the northern line there was three complete staged spots with drip torch fuel, 5 gallons water, flapper and a council rake. Two separate areas were staged with a 5 gallons of water. Journot staged two smoke ahead signs on Atkinson road, one on the north side of the unit and the other on the southern side of the unit. White took on site weather at 12:00pm. A crew briefing was held at 12:05pm.

A test fire was lit 1215. After 2 minutes the test fire was extinguished. Ignition started at the northwest corner, west side of young pines. This was done to burn out the young pines with the proper wind direction and to prevent torching embers from travelling outside the unit. Young pine stand was burned out in approximately 10 minutes. The two crews then began igniting in opposite directions around the unit. The on-crew traveled east around the north line to the east

and the off-crew proceeded south on the west line. The on-crew burned out 500' of north line then crossed the horseshoe Lake. The off-crew proceeded to burn south on the west line. The on-crew crossed the peninsula and scratched a hand line in on the south lake levee to prevent fire from heading around levee. Simultaneously the off-crew ran perpendicular strips to completely burn out the northwest corner. The on-crew headed down the north line igniting a single strip fire along the fire line and igniting around the large slash piles. The on-crew ignited 500' and stopped ignition when Melnechuk reported head fire moving quickly toward the west line. Baker and Zollner checked out the flaming front and saw that the fire behavior was moderate and stopping at the interior road. The on-crew then continued igniting down the north line while the off-crew worked their way to the northeast corner. The on-crew ignited 200' of the second savanna area and let the fire move in. After the fire intensity had reduced the on-crew continued ignition to the east corner, where the corner was burned out by igniting with a large circle around the east corner. This allowed the east corner to burn out. Then the east line was lit all the way to the lake allowing head fire to pull through the eastern savanna (FM2).

The fire was rung at 1420 and interior ignition was begun by Melnechuk and Zollner. Zollner was the interior ignitor for the east savanna area and Melnechuk lit along the lake edge and in the western savanna to the pine-oak area (FM9). Interior Ignition was complete a 1500. Complete burn out was done at 1400. Crews started mop-up at 1500. The west line was mopped-up at 1530, and the east crew was finished mop-up at 1600. The on-crew spent 30 minutes of mop-up putting out several slash piles on the perimeter of the east line. The Chevy pumper was used to help mop-up the slash piles. Half the tank was used on the Chevy pumper during mop-up. At 1600 the slash piles had been reduced to smoldering piles of duff and wood.

A debriefing was held at 16:05 and the equipment was destagged. The crew was sent home with the exception of Baker, Journot, Zollner, and Melnuchuk. The four members of the crew then patrolled the unit till 1700. Baker and Zollner walked the north and east line while Journot and Melnechuk patrolled the west and south line. The two teams meet at the southeast corner and walked back along the east and north lines. At 1700 the two smoke ahead signs were taken down and remainder of the crew headed home. The unit was checked daily for the following week due to smoldering debris piles, until rain extinguished the unit.

Notes:

1. A prescribed burn sign scheduled might have prevented the Boy Scouts from using the site and delaying the burn by one week.

2. Slash piles burned out quickly. With low winds it probably is not necessary spend time on suppressing slash piles on the east line.

3. The interior road entrance to the burn unit needs to be blocked off prior to burn.

Immediate Post Burn Effects

Overall unit:	pine savanna; oak-pine woodland; oak bottoms
Percent coverage:	77%
Burn severity organic substrate:	2.1 (moderately burned)
Burn severity understory (3' or less):	1.5 (lightly burned)
Overstory char height class:	1.4 (5'-10')
Overstory char degree class:	1.3 (medium)
Midstory scorch percent class:	1.1 (25%-50%)
Overstory scorch percent class:	0.7 (less than 25% of live crowns)
Scorch height class:	1.6 (10'-20')

Natural community:	pine savanna	oak-pine woodland	oak bottoms
Percent coverage:	94%	100%	12%
Burn severity organic substrate:	2.3 (moderate)	2.1 (moderate)	1.7 (light)
Burn severity understory:	1.8 (light)	1.3 (light)	1.0 (scorched)
Overstory char height class:	1.6 (5'–10')	1.3 (5'-10')	1.0 (less than 5')
Overstory char degree class:	1.3 (medium)	1.3 (medium)	1.0 (light)
Midstory scorch percent class:	n/a	1.6 (25% - 50%)	0.7 (less than 25%)
Overstory scorch percent class:	1.1 (25% - 50%)	0.3 (less than 25%)	0.0 (no scorch)
Scorch height class:	2.0 (10'-20')	1.5 (10'–20')	0.7 (less than 10')

Ecological Objectives

1. 70% - 90% unit coverage. The unit was 77% burned. Much of the flooded (beaver ponds) FM8 did not burn. Coverage was virtually complete for the oak-pine woodlands and pine savanna. Scattered unburned areas remained in pine savanna that had standing water.

2. Organic substrate burn severity class = 1.0 - 3.0. Substrate burn severity = 2.1 (moderately burned) and ranged from 1.7 (light) in the oak bottoms to 2.3 (moderate) in the pine savanna. The upper litter layer was removed throughout the unit. In the pine savanna abundant bare soil was exposed, especially where logging debris ignited and burned to ash. Litter was removed and bare soil was exposed in the drier portion of the oak-pine woodland. Where the oak bottoms burned the litter layer was removed to duff, rarely to bare soil. Scattered piles and other large woody debris downed due to the ice storm were reduced throughout the oak – pine woodland.

3. Understory burn severity class (less than 3') = 1.0 - 3.0. Understory burn severity = 1.5 (lightly burned) and ranged from 1.0 (scorched) in the oak bottoms to 1.8 (light) in the pine savanna. Small stems (less than 1.0" basal diameter) were top-killed but not consumed. Virtually all pine reproduction was removed. All sprouts in the pine savanna were top-killed. Most vines and small understory brush was top-killed in the oak – pine woodland.

4. Overstory char height class = 0.5 – 1.5. Overstory char = 1.4 (5'-10') and ranged from 1.0 (less than 5') in the oak bottoms to 1.6 (5'–10') in the pine savanna. On overstory pine, bark char was 8' or less on the boles, except where the trees were near slash that ignited and burned intensely. On overstory oak, char was usually less than 3' on the boles, except where downed woody debris (ice storm) ignited and burned intensely. This height of char will not effect overstory trees. Small diameter (less than 4" dbh) saplings and shrubs were top-killed.

5. Overstory char degree = 0.5 – 1.5. Overstory char degree = 1.3 (medium) and ranged from 1.0 (light) to 1.3 (medium). In general, char was continuous with minor reductions in bark thickness on pine and hardwoods. This level of char will cause scaring where the trees were near downed woody debris. Some overstory mortality will result in fire-sensitive species.

6. Midstory scorch percent class = 1.0 – 3.5. Midstory scorch percent = 1.1 (25% - 50% of live crowns) and ranged from 0.7 (less than 25% of live crowns) in the oak bottoms to 1.6 (25%-50%) in the oak – pine woodland. There is no midstory in the pine savanna. This level of scorch is unlikely to impact the midstory of the oak bottoms. In the oak - pine woodlands this level of scorch will kill fire-sensitive saplings and top-kill most shrubs.

7. Overstory scorch percent class = 0.5 – 2.0. Overstory scorch percent = 0.7 (less than 25% of live crowns) and ranged form 0.0 (no scorch) in the oak bottoms to 1.1 (25% - 50% of live crowns) in the pine savanna. The overstory trees are tall with their lower branches usually right at the scorch line. Where heavier scorch was evident it was due to the ignition of piles of downed woody debris which burned more intensely. Some overstory mortality in the pine savanna may result as scattered trees were more than 75% scorched.

8. Overstory scorch height = 0.5 – 1.5. Overstory scorch height = 1.6 (10'-20') and ranged from 0.7 (less than 10') in the oak bottoms to 2.0 (10'-20') in the pine savanna. The scorch line was 12' in the oak – pine woodland and 20' in the pine savanna, except where piles of downed woody debris burned intensely and scorched nearby overstory trees. This level of scorch will cause scattered mortality in the pine savanna. Short, midstory pine reproduction and shrubs and saplings of fire-sensitive species will show scattered mortality and top-kill.

All ecological goals were met by this burn. Burn coverage was excellent, except in the wet bottoms. The litter layer was much reduced, frequently to bare soil. Much of the woody debris from logging operations and the recent ice storm was burned to ash, although abundant debris remains in the unit. The pine reproduction and shrubs were killed or top-killed throughout the unit. As planned, the overstory of the pine savanna was mildly impacted by the burn. The overstory of the oak – pine woodlands was minimally impacted.

THE NATURE CONSERVANCY
FIRE SUMMARY REPORT AND POST BURN EVALUATION

Site: Pine Savanna Restoration Area - Pine Bluff Arsenal.
Unit: Hourglass Unit, 36 acres.

Date Burned: 08 March 2001.
Date Evaluated: 09 March 2001.
Reported By: Doug Sprouse, Douglas Zollner.

Fire Weather forecast

Date:	08 March 2001	
Time:	0900	1225
Humidity (low):	37%	43%
Temperature (high):	62°	not as high
Wind speed:	5 mph	0 - 6 mph
Wind direction:	west - northwest	north, changing east
Sky:	high clouds	clouds coming in
KBDI:	~200	
Comments:	10% chance of light rain	

On-site Weather

Time:	0900	1030	1120	1155	1230
Location:	South corner	S corner	S corner	S corner	S corner
By:	D. Zollner	DZ	DZ	C. Moscardelli	CM
Dry bulb:	52°	55°	58°	60°	59°
Wet blub:	45°	46°	47°	49°	48°
Dew point:	37°	36°	35°	38°	36°
Humidity:	57%	49%	42%	44%	43%
Wind speed:	2-5 mph	3-6 mph	0-5 mph	0-6 mph	0-5 mph
Wind direction:	30°	0°	0°	350°	10°
Sky:	clear	mostly clear	clear	clear	clear

Crew

On-crew: Doug Sprouse - Fire Leader (water, flapper and rake) with Cara Moscardelli - igniter (torch and water), Seth Young – 2nd water (ATV w/water, rake, pulaski, drip torch), and Nathan White - drag (ATV w/water, rake, pulaski, drip touch).

Off-crew: Aric Journot- crew boss (water and rake) with Kevin Seaford - igniter (torch), and Douglas Zollner - drag/interior ignition, staged - ARFO GMC pumper w/water, rake, flapper, pulaski, drip torch.

Ignition

Test fires	1215.
Ignition begun:	1255.
Perimeter rung:	1434.
Interior ignition complete:	1515.
Interior burnout:	1545.

Fire Narrative

The crew had prepared the lines the week prior to the fire. On the day of the burn all lines were mown in necessary areas along the powerline. The crew also finished raking snags on the morning of the burn.. The unit is a banana shaped unit of Fuel Model 9, pine/oak leaf litter, and Fuel Model 2, Pine savanna. The topography is flat. There is a small drain bisecting the northern portion of the unit. The northeast fireline is a mown powerline right of way, 30' wide, with wooden poles through FM9 and FM2. The southwest line is a 30' wide gravel road adjacent to FM9. An old logging road crosses the center of the unit with 10'-15' tall pine along both sides. Directly southeast of the unit is an old field (FM3) with a fence around it. The total amount of crew time spent prepping the lines was three hours the day of the burn and four hours one week earlier.

Water was obtained from the PBA hydrant at the base Fire Station the morning of the burn. The TNC 300-gallon pumper was staged at the southeast corner with flapper, council rake, Pulaski, and drip torch fuel. The TNC 200-gallon pumper was staged with flapper, council rake, pulaski, drip torch and drip torch fuel and used for patrol. Two ATV's were staged with drip touch, flapper, council rake, and pulaski, and were used for patrol along the powerline. On the western fire line there was two staging areas with drip torch fuel, 5 gallons water, flapper and a council rake. On the northern line there was three complete staged spots with drip torch fuel, 5 gallons water, flapper and a council rake. Two separate areas were staged with a 5 gallons of water. Journot staged two smoke-ahead signs along McCoy road. Zollner and Moscardelli took on site weather prior to the burn. A crew briefing was held at 1200.

A test fire was held at 1215 at the southeast corner. After 5 minutes the test fire was extinguished due to erratic winds. After observing winds another test fire was held at the northwest corner and extinguished. After retrieving a weather update from the Arkansas Forestry Commission, Sprouse held a final test fire and began ignition of the unit at the drain near the northwest corner. Both crews proceeded from northwest to southeast along the lines. The on-crew had the northeast line, the off-crew had the southwest. No problems were encountered by either while igniting the baselines. Zollner began interior ignition at 1424. The fire was rung at 1434. Igniters from both crews started interior ignition immediately. Interior ignition continued until 1515.

The crews patrolled their lines until 1530 and began mop up and destaging. Very little mop up was needed on either line. There were two large burning snags, it was determined that they would be monitored only and checked at daylight the next morning.

A debriefing was held at 1600. Sprouse patrolled the unit while the crew packed the equipment. The crew left the unit by 1630. Sprouse checked the unit the following morning. The unit was checked every day until it was declared cold out by Zollner on 12 March 2001.

The burn was mild an the crew encountered no problems on any of the lines. Headfire flame lengths ranged from 4' in FM2 to 2' in FM9; with brushpiles and small pine torching to 8'. Backfire flame lengths in FM2 were 2', there was little backfire in FM9. Smoke production was light but visibility on the road was limited at times. There was standing water along much of the powerline. There was a moderate but nagging amount of heavy truck traffic along McCoy road.

Notes:

1. The base authorities were helpful in making contacts and should always be utilized when burning at PBA.

2. There were many heavy trucks using the same roads as the crew. The possibility of closing roads should be explored further, as these are not public highways.

Immediate Post Burn Effects

Overall unit:	pine savanna; oak woodland, oak-pine - woodland
Percent coverage:	88%
Burn severity organic substrate:	1.9 (lightly burned)
Burn severity understory (3' or less):	1.4 (lightly burned)
Overstory char height class:	1.0 (less than 5')
Overstory char degree class:	1.1 (medium)
Overstory scorch percent class:	0.1 (less than 25% of live crowns)
Overstory scorch height class:	0.5 (less than 10')

Natural community:	pine savanna	oak and oak-pine woodland
Percent coverage:	92%	86%
Burn severity organic substrate:	2.0 (light)	1.8 (light)
Burn severity understory:	1.5 (light)	1.3 (light)
Overstory char height class:	1.1 (5' – 10')	1.0 (less than 5')
Overstory char degree class:	1.2 (medium)	1.1 (medium)
Overstory scorch percent class:	0.2 (less than 25%)	0.0 (no scorch)
Overstory scorch height class:	0.8 (less than 10')	0.4 (less than 10')

Ecological Objectives

1. <u>90%+ unit coverage.</u> The unit was 88% burned. Scattered unburned areas remained in the lower portions of the oak-pine woodland and pine savanna that had standing water, and along the old right-of-way with young pine regeneration that bisects the unit.

2. Organic substrate burn severity class = 1.0 - 3.0. Substrate burn severity = 1.9 (lightly burned) and ranged from 1.8 to 2.0. The upper litter layer was mostly removed. In places the litter layer was removed to duff, rarely to bare soil. The duff was generally not impacted by the burn. Scattered piles and other large woody debris, snags, and old stumps were burned in the pine savanna and right-of-way. Abundant downed woody debris remains extant.

3. Understory burn severity class (less than 3') = 1.0 - 3.0. Understory burn severity = 1.4 (lightly burned) and ranged from 1.3 to 1.5. Small stems (less than 0.5" basal diameter) were top-killed but not consumed. Pine reproduction small than 3' was killed. Pine reproduction larger than 3' was generally not impacted by the burn.

4. Overstory char height class = 0.5 – 1.5. Overstory char = 1.0 (less than 5') and ranged from 1.0 (less than 5') in the oak and oak-pine woodland to 1.1 (5' – 10') in the pine savanna. On overstory pine bark char was commonly 4' – 6' on the boles. On overstory oak char was usually less than 2' on the boles. This height of char will not effect overstory trees. Small diameter (less than 5" dbh) shrubs were top-killed.
5. Overstory char degree = 0.5 – 1.5. Overstory char degree = 1.1 (medium) and ranged from 1.1 to 1.2. In general, char was light and spotty on pine with minor reductions in bark thickness on hardwoods. This level of char will not affect the overstory. Where scattered or piled woody debris were close to the boles of overstory trees the fire was more intense. Fire scars were created on scattered overstory oaks adjacent to downed woody debris but no overstory mortality is expected.

6. Overstory scorch percent class = 0.5 – 2.0. Overstory scorch percent = 0.1 (less than 25% of live crowns) and ranged form 0.0 (no scorch) in the oak and oak-pine woodlands to 0.2 (less than 25% of live crowns) in the pine savanna. Generally, the scorch line was 3' – 5' throughout the unit. The overstory trees are tall with their lower branches well above the scorch line. Where scorch was evident is was due to the ignition of piles of downed woody debris which burned more intensely.

7. Overstory scorch height = 0.5 – 1.5. Overstory scorch height = 0.5 (less than 10') and ranged from 0.4 to 0.8. The scorch line was commonly 3' – 5', to 15' near piles of burning brush. This level of scorch will not impact the overstory. Short, mid-story pine reproduction and shrubs of fire-sensitive species will show scattered mortality and top-kill.

All ecological goals were met. As planned the overstory was not impacted by the burn. Burn coverage was good. The litter layer was reduced but rarely to bare soil. Woody debris were not reduced as much as desired due to wetter than normal conditions. Pine reproduction and shrub layers were lightly impacted.

THE NATURE CONSERVANCY
FIRE SUMMARY REPORT AND POST BURN EVALUATION

SITE: Pine Bluff Arsenal; Tripletts Bluff.
UNIT: Nilo Pond Unit – 183 acres.
DATE BURNED (blacklining): 09 March 2001.
REPORT BY: Mike Melnechuk and Douglas Zollner.

FIRE WEATHER FORECAST

Date:	09 March, 2001
Time:	0900
Humidity (low):	33%
Temperature (high):	53°F
Wind Speed:	5-10 mph
Wind Direction:	north, northeast
Sky:	partly cloudy

ON-SITE WEATHER

Time:	0940	1035	1120	1200	1320	1405	1500
Location:	NW cor.	NW cor.	NW cor.	NW cor.	SW cor.	West line	NW cor.
By:	C. Moscardelli	CM	CM	CM	CM	CM	CM
Dry Bulb:	45°F	51°	49°	49°	51°	49°	49°
Wet Bulb:	39 °F	43°	41°	41°	42°	40°	40°
Humidity:	57%	50%	48%	48%	45%	42%	42%
Wind Speed:	0-7 mph	0-7	0-6	0-6	0-5	0-5	0-5
Wind Direction:	NE	N	NE	NE	NE	N/NE	NE
Sky:	clear	clear	clear	clear	clear	clear	clear
KBDI:	200						
Comments:	winds forecasted to decrease in speed, and did. Relative humidity did not get as low as forecasted and temperatures not as high as forecasted.						

CREW

Mike Melnechuk - fire leader (rake and water).

David Baker – ignition boss (torch and water) with Nathan White – igniter (torch), and Seth Young – igniter (torch), and Douglas Zollner – interior ignition specialist (torch).

Aric Journot – holding boss (flapper and water) with Kevin Rehman – holding (ATV, water, rake, pulaski, torch), Cara Moscardelli – holding (ATV, water, rake, pulaski, torch) and weather, Kevin Seaford – holding (ARFO GMC pumper, rake, pulaski, torch), and Doug Sprouse – drag (ARFO Chevy pumper, rake, flapper, pulaski).

IGNITION BEGAN: 1315, SE corner.
PERIMETER RUNG: 1545, NE corner (tied into Ark. River)

FIRE NARRATIVE

The burn unit is a 183 acre rectangle of mainly FM9, with some FM2 and FM8, running parallel along Tripletts Bluff and the Arkansas River. The firelines were installed about a month prior to the burn, and the north line was leaf-blown again the morning of the burn. A 3'-wide handline was installed by the crew to exclude a four-acre clear-cut from the unit at the SW corner the morning of the burn. The north fireline is a 10'-wide blown and raked ATV trail that is adjacent to FM9 and FM2. The west line is a 20'-wide gravel road, with an additional 15' wide mown rights-of-way on either side of the road, adjacent to FM9 and FM2. The south line is a 12'-wide gravel road adjacent to FM9, FM8, and FM3 towards the east, and a 6'-wide, 15' long stretch of raked handline from the road to the Arkansas River at the SE corner. The northern ¼ of the east line is a 15'-wide gravel road and an 8'-wide, 45' long handline connecting to the Arkansas River. The rest of the east line was the Arkansas River.

Melnechuk made all official notifications the morning of the burn and acquired a weather forecast from AFC at 1000. The crew filled both ARFO engines, ATV's, reserve water jugs, and backpack-pumps at ARFO prior to going to the site. The crew staged the lines with the reserve 5-gallon water jugs, drip-torch fuel, flappers, and a leaf-blower.

The ARFO GMC pumper was staged with pulaski, flapper, rake, extra DT, and 200 gallons of water. Both ATV's were staged with pulaski, rake, and 15 gallons of water. The ARFO Chevy pumper was staged with 300 gallons of water, pulaski, rake, flapper, and chainsaw. Reserve water jugs were staged on all the lines, 4 jugs were staged evenly-spaced along the west line, 2 evenly-spaced along the north line, one at the NE corner, one on the east line at the handline, and 2 along the south line. Reserve drip torch fuel was staged at the NE corner, the NW corner, and 4 evenly spaced down the west line. Reserve drip torches were staged in the GMC pumper.

The crew briefing was held at 1305 and a test fire was lit at the SE corner at 1315. After 5 minutes of test fire, the wind and fire behavior was acceptable and the fire was pronounced a go. The igniters started to burn out the SE corner with the fire behavior mild and burning patchy through the Johnson grass, and not at all in the FM8. The pace of ignition for the igniters was slow, so they discontinued ignition of the FM 8, and resumed ignition at the handline around the clear-cut north of the SW corner in some drier FM9. After igniting around the clearcut and out to the road, the igniters were still getting minimal fire behavior, and Melnechuk decided to halt ignition and wait ½ hour to resume, hoping the relative humidity would drop as forecasted. After the ½ hour the fire behavior was still poor, so Melnechuk and Zollner convened and decided to establish a blackline around the unit, and to burn out the interior of the unit at another time with better weather conditions.

After the decision to blackline the unit was made, the pace of ignition increased with little to no probability of spotting across the lines, and the ignition crew used three igniters, lighting staggered strip headfires approximately 10 feet apart to establish blackline. They continued this technique moving north along the west line, then proceeding east down the north line, and finally

tying the fire in with the Arkansas River at the northeast corner at 1545. Holding personnel followed the igniters down the lines and reported no problems. White attempted to ignite some of the ravines along the northeast corner with limited success, getting some areas of fire to make small runs uphill along the slopes. The crew established a blackline around the entire unit, with the exception of the FM 8 area to the south, which varied in width from 10' to 50'. No mop-up was necessary. The crew then de-staged and departed the unit at 1645. Baker, Melnechuk, and Zollner stayed another hour at the site to make a final patrol, and then deemed the unit secure and left the site at 1800.

Headfire flame lengths in FM9 were from 0.6' to 1.5', with the latter only occurring in areas where the parallel strip headfires were drawing off of each other, and on the slopes of some ravines. Headfire did not penetrate FM8. The FM2 headfire flame lengths were a little higher because of the grass component and the fuels being unsheltered ranging from 2' - 4', but with very slow rates of spread and some of the larger slash debris even halting the progress of the fire due to the high 100 and 1000 hour fuel moisture content. Due to the slow rates of spread and the rising humidity the fire reached the moisture of extinction when it was between 50' and 100' into the unit in FM2. Backfire flame lengths in the FM9 were between 0.0' and 0.5' and generally less than 1.5 feet in the FM2. The backfire did not burn into FM 8.

NOTES:

1. The weather forecasted did not occur, with neither temperatures getting as high as predicted, nor humidities as low.

DATE BURNED: 22 March, 2001.
DATE EVALUATED: 28 March, 2001.
REPORT BY: Mike Melnechuk and Douglas Zollner.

FIRE WEATHER FORECAST

Date:	22 March, 2001
Time:	0900
Humidity (low):	30%
Temperature (high):	80^{O}F
Wind Speed:	5-10mph
Wind Direction:	south
Sky:	partly cloudy

ON-SITE WEATHER

Time:	1408	1703
Location:	NW corner	NW corner
By:	Kevin Seaford	KS
Dry Bulb:	78°F	69°
Wet Bulb:	60°F	56°
Humidity:	34%	44%
Wind Speed:	6 mph	2
Wind Direction:	east	east
Sky:	clear	clear
KBDI:	200	

CREW

ON CREW: Mike Melnechuk - fire leader - 1st water (rake and water) with Aric Journot – igniter (drip torch), and Nathan White – holding (ATV with water, rake, and pulaski).

OFF CREW: David Baker – crew boss - 1st water (rake and water) with Douglas Zollner – interior ignition specialist (drip torch), Seth Young – 2nd water - igniter (drip torch and water), and Kevin Seaford – holding (ARFO GMC pumper with water, rake, and pulaski).

IGNITION BEGAN:	1430, NW corner and SW corner-interior.
PERIMETER RUNG:	**perimeter was rung on previous blackline burn.
INTERIOR IGNITION COMPETED:	1645
INTERIOR BURNOUT:	1730

FIRE NARRATIVE

(see firelines previous). The entire unit had 30' – 50' of blackline in addition to other firelines.

Baker made all official notifications enroute to the unit and Zollner acquired a weather forecast from AFC at 1000. The crew filled the ARFO GMC engine, ATV, and waterpacks at the base fire department prior to the burn.. No staging of reserve water jugs or drip torch fuel on the lines was done due to the security of the unit from the earlier blacklining and the ability of the pumper and ATV to quickly provide fuel when needed to the igniters. The ARFO GMC pumper was staged with pulaski, rake, extra DT, and 200 gallons of water. The ATV was staged with pulaski, rake, 15 gallons of water, and drip torch fuel.

The crew briefing was held at 1420 and a test fire was lit at the NW corner inside the unit by Journot and Melnechuk at 1430. After 5 minutes of test fire, the wind and fire behavior was acceptable and Melnechuk communicated via the radio that the fire was a go. Zollner immediately started to burnout the southern portion of the unit with fire moving through the FM9 very well, while the rest of the off-crew patrolled the south and west lines. The on-crew ignition

followed the edge of the blackline through the FM2, with the fire backing into the unit well. The on-crew proceeded to the fuel break between the FM2 and FM9, and had to slow down the pace of ignition with the fire re-burning through the blackline in many places along the north line. White patrolled the north line while Journot and Melnechuk made their way east to the road at the NE corner. Once they had re-established a secure blackline, Melnechuk had Journot ran a line of fire 300 yards south down the easternmost ravine, with headfire moving up the western slope of the ravine and carrying well into the unit. Journot then moved back to the NE corner and continued ignition along the east line to the handline that tied-into the Arkansas River. Journot then went interior and resumed igniting both sides of the large easternmost ravine to the river, and several side ravines. Melnechuk established more blackline at the handline with fusees, and fire started to move away from the line and into the unit. Zollner requested Young to start the interior ignition of several other ravines, and he moved from holding to interior ignition, while Baker and Seaford patrolled the south and west lines. White reported smoke on Webster Road and the incinerator operation to the north, but it did not affect visibility. Journot reported the northern ½ of the unit almost completely burned-out, and bumped up to the NW corner to burn out the remaining patches of fuel in the FM2, while Melnechuk and White patrolled the north and east lines. Zollner and Young reported the southern ½ of the unit burned-out and bumped up to the NW corner to burn out the pine savanna and monitor the fire there. Journot exited the unit at 1645 and interior ignition was completed.

There was no problem with holding the lines. Little mop-up was necessary, due to the previous blackline burn, and Melnechuk had White make a final patrol around the north and east lines, while Baker and Seaford monitored a small line of fire backing into the handline around the clearcut at the SW corner. The crew then de-staged, a de-briefing was held, and the crew departed the unit at 1730. Baker, Melnechuk, and Zollner stayed another hour at the site to make a final patrol, and then deemed the unit secure and left the site at 1830.

Headfire flame lengths in the FM9 were from 3' – 6', with the greatest behavior on the slopes of the ravines and in areas with more pine overstory. Headfire in the FM8 creeped around with 6" inch flame-lengths. The FM2 headfire flame lengths were from 5' – 12', higher where there were continuous downed woody debris, brushpiles and juvenile pines. Flanking fire in the FM9 ranged from 2' - 4', and 3' - 5' in the FM2. Backfire flame lengths in the FM9 were between 0.5' - 1.5', and generally less than 3' in the FM2. The backfire did not burn at all into the FM8.

NOTES:

2. The unit is very secure, with good lines and a major river to the east, so a minimal number of personnel could be used to burn this unit in the future if the need arose.

3. The topography (ravines) can dominate the winds, so care must be taken not to run fire uphill at unprotected lines.

4. The incinerator operation to the north can produce heavy traffic along the base roads to the north and west during shift changes especially around 1500, so smoke conditions must be monitored.

Immediate Post Burn Effects

Overall unit:	oak-pine - woodland, oak bottoms, pine savanna
Percent coverage:	83%
Burn severity organic substrate:	2.0 (lightly burned)
Burn severity understory (3' or less):	1.4 (lightly burned)
Overstory char height class:	1.4 (5'-10')
Overstory char degree class:	1.2 (medium)
Midstory scorch percent class:	1.4 (25%-50%)
Overstory scorch percent class:	0.2 (less than 25% of live crowns)
Scorch height class:	1.3 (10'-20')

Natural community:	oak-pine woodland	pine savanna	oak bottoms
Percent coverage:	95%	89%	47%
Burn severity organic substrate:	2.1 (moderate)	2.3 (moderate)	1.6 (light)
Burn severity understory:	1.5 (light)	1.8 (light)	1.0 (scorched)
Overstory char height class:	1.5 (5'–10')	1.5 (5'-10')	1.0 (less than 5')
Overstory char degree class:	1.3 (medium)	1.0 (light)	1.0 (light)
Midstory scorch percent class:	1.7 (25%-50%)	n/a	0.5 (less than 25%)
Overstory scorch percent class:	0.2 (less than 25%)	0.9 (less than 25%)	0.0 (no scorch)
Scorch height class:	1.4 (10'-20')	1.8 (10'–20')	0.9 (less than 10')

Ecological Objectives

1. 70% - 90% unit coverage. The unit was 83% burned. Scattered unburned areas remained in the lower portions of the oak-pine woodland and pine savanna that had standing water. The oak bottoms were partly flooded and coverage was low at the southeast corner of the unit.

2. Organic substrate burn severity class = 1.0 - 3.0. Substrate burn severity = 2.0 (lightly burned) and ranged from 1.6 (light) in the oak bottoms to 2.3 (moderate) in the pine savanna. The upper litter layer was mostly removed throughout the unit. In the pine savanna abundant bare soil was exposed, especially where logging debris ignited and burned to ash. Litter was removed and bare soil was exposed in the drier portion of the oak-pine woodland. Where the oak bottoms burned the litter layer was removed to duff, rarely to bare soil. The duff was generally not impacted by the burn in the moister areas of the unit. Scattered piles and other large woody debris downed due to the ice storm were burned throughout the oak – pine woodland.

3. Understory burn severity class (less than 3') = 1.0 - 3.0. Understory burn severity = 1.4 (lightly burned) and ranged from 1.3 to 1.5. Small stems (less than 0.5" basal diameter) were top-killed but not consumed. Pine reproduction smaller than 3' was killed. Pine reproduction larger than 3' was heavily scorched but is likely to survive. Almost all sprouts

in the pine savanna were top-killed. Most vines and small understory brush was top-killed in the oak – pine woodland. Two cane stands in the oak bottoms were burned.

4. Overstory char height class = 0.5 – 1.5. Overstory char = 1.4 (5'-10') and ranged from 1.0 (less than 5') in the oak bottoms to 1.5 (5' – 10') in the pine savanna and oak – pine woodland. On overstory pine, bark char was commonly over 5' on the boles. On overstory oak, char was usually less than 3' on the boles. This height of char will not effect overstory trees. Small diameter (less than 5" dbh) saplings and shrubs were top-killed.

5. Overstory char degree = 0.5 – 1.5. Overstory char degree = 1.2 (medium) and ranged from 1.0 (light) to 1.2 (medium). In general, char was light and spotty on pine with minor reductions in bark thickness on hardwoods. This level of char will not affect the overstory. Where scattered or piled woody debris were close to the boles of overstory trees the fire was more intense. Fire scars were created on scattered overstory oaks adjacent to downed woody debris but little overstory mortality is expected.

6. Midstory scorch percent class = 1.0 – 3.5. Midstory scorch percent = 1.4 (25% - 50% of live crowns) and ranged from 0.5 (less than 25% of live crowns) in the oak bottoms to 1.7 (25%-50%) in the oak – pine woodland. There is no midstory in the pine savanna. This level of scorch is unlikely to impact the midstory of the oak bottoms. In the oak - pine woodlands this level of scorch will kill fire-sensitive saplings and top-kill most shrubs.

7. Overstory scorch percent class = 0.5 – 2.0. Overstory scorch percent = 0.2 (less than 25% of live crowns) and ranged form 0.0 (no scorch) in the oak bottoms to 0.9 (less than 25% of live crowns) in the pine savanna. The overstory trees are tall with their lower branches well above the scorch line. Where scorch was evident is was due to the ignition of piles of downed woody debris which burned more intensely.

8. Overstory scorch height = 0.5 – 1.5. Overstory scorch height = 1.3 (10'-20') and ranged from 0.9 (less than 10') in the oak bottoms to 1.8 (10'-20') in the pine savanna. The scorch line was 10' in the oak – pine woodland and 12' in the pine savanna, except where piles of downed woody debris burned intensely and scorched nearby overstory trees. This level of scorch will not impact the overstory. Short, midstory pine reproduction and shrubs and saplings of fire-sensitive species will show scattered mortality and top-kill.

All ecological goals were met by this burn. Burn coverage was excellent even into the oak bottoms and cane stands. The litter layer was much reduced, often to bare soil. Much of the woody debris from logging operations and the recent ice storm was burned to ash, although abundant debris remains in the unit. The pine reproduction and shrubs were killed or top-killed throughout the unit. As planned, the overstory of the pine savanna was mildly impacted by the burn. The overstory of the oak – pine woodlands was minimally impacted.

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Refuge Woods; Pine Bluff Arsenal.
Location: T5S, R10W, section 13; Jefferson County, Arkansas.
Unit: Big Pine Unit - 315 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: January 2001; Mike Melnechuk and Douglas Zollner.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

Arkansas Forestry Commission; (800) 468-8834 to report an escape.

Jefferson County uses 911 for all emergency responses **(to call an ambulance).** A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: Lisa Mattimoe (SERO); (919) 967-5493 ext. 115.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (505) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

none

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit - acres	aspect - % slope	exposure
oak-pine litter	9	80% - 230 acres	none - flat	sheltered
pine savanna/grass	2 (11)	15% - 65 acres	none - flat	exposed
grass – slash	12	5% - 20 acres	none - flat	exposed

Fire Unit Narrative Description:

This unit comprises the southern and eastern portion of the Refuge Woods area. The unit consists mainly of mixed oak and pine woodlands (FM9), with a heavily thinned area of pine savanna and grass (FM2) in the western portion of the unit, and two cut-over areas (FM12). An ephemeral stream runs from north to south across the unit which separates the FM2 from the FM9, and drains into Caney Bayou just south of the unit. The stream widens towards the southern portion of the unit to a bayou with cypress, tupelo, and river birch. The unit is flat with very little topography except for some small slopes just to the west of the stream. The unit is entirely surrounded by roads, except for a 200-yard stretch of hand-line connecting the old logging road with the PBA Warbritton Gate paved road in the northeastern section of the unit.

Oak-pine/litter: Most of the unit is covered by oak-pine/leaf litter (FM9). Where pine needles predominate this area will burn on the hot side of FM9. The ground cover is mostly pine needles mixed with oak leaves. Pine needle draped vine tangles and large snags are extant. At the edges of the unit shrubs and herbaceous vegetation is thicker and often draped with pine needles. In several areas right-of-way maintenance has resulted in piles of woody debris, especially along the road to the south and east.

Pine savanna/grass: The pine savanna (FM2) is a heavily thinned area with abundant grass and a thick herbaceous layer at least 3' tall. Pine regeneration, sprouting oaks, and logging slash are abundant. Some of the slash has been piled. Snags are extant.

Grass/slash: The grass/slash (FM12) is a 5 acre clearcut about three years old just east of the ephemeral creek on the north line, and a 15 acre selectively - cut area at the southeast corner. In the clear-cut the herbaceous layer is about 3' tall with abundant oak sprouts, pine regeneration, and scattered slash, with several large slash piles. The selectively – cut area is a very recent logging operation with large amounts of woody debris on the ground, but still very "green", and not likely to ignite.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological Stewardship

Site fire management goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The maintenance of the open pine savanna. The maintenance and enhancement of fire-dependent rare species populations.

Specific Burn Unit Objectives:	
70%-90% unit coverage.	
substrate burn severity class	1.0 – 3.0.
understory burn severity class	1.0 – 3.0.
overstory char height class	0.5 – 1.5.
overstory char degree	0.5 – 1.5.
overstory scorch percent class	0.5 - 2.0.
overstory scorch height class	0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308

Web sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS)
http://www.srh.noaa.gov/ftproot/12k/html/forest2.html (Forestry forecast, KB index, 10 hr fuels)
http://www.forestry.state.ar.us/burnbans.html (County burn bans)

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction	any		180°-270° (west-south)
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	4%	12%	6%
inferred 10-hour fuel moisture	7%	14%	10%
atmospheric mixing height	5	3	AFC category days*
Guidance parameters:			
air temperature	85F°	35°F	
relative humidity	60%	25%	
20' windspeed	18 mph	5 mph.	

Notes: *ventilation rate 4000-16,000 = mixing height x transport windspeed.

Due to the likelihood and desirability of slash piles becoming engaged and tossing embers, low inferred 10-hour fuel moistures (7%-8%), and relative humidity (25%-28%) with high effective windspeeds (9 mph or stronger gusts) are excluded from the burn window.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

	FM9 (80% - 230 ac.)	FM2 (15% - 65 ac.)	FM12 (5% - 20 ac.)
Maximum behavior			
headfire flame length (ft)	7	15	6
backfire flame length (ft)	1	2	1
hf rate of spread (ch/hr)	44	216	18
bf rate of spread (ch/hr)	1	3	0
Minimum behavior			
headfire flame length (ft)	1	3	2
backfire flame length (ft)	1	1	1
hf rate of spread (ch/hr)	2	6	2
bf rate of spread (ch/hr)	0	1	0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

Due to the size of the unit and expected heavy smoke production, ignition will begin as early in the day as possible. A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine and oak leaf litter at a slow rate with 1' to 2' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in FM9 and to ignite a continuous line in disturbed areas. In FM9, 10' of blackline is adequate.

Ignition will continue along flanking lines. Fire should pull into the unit with 2' – 4' flame lengths in FM9. In FM2 and FM12 fire will move into the unit with 5' – 6' flame lengths. Torching of vine ladders can be expected. Downed woody debris and slash will become engaged and areas of intense fire may occur along the firelines. Smoke can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 15' or more. Headfire will move quickly to burnout in FM2 and FM12. In FM9 headfire will move more slowly. Flame lengths in FM2 and FM12 will be 10' – 15' with torching of vine ladders common. Flame lengths in FM9 will be 5' – 7'. Slash piles that become engaged will burn intensely with flame lengths of 20'+. The fire is likely to be continuous, stopping only at low wet areas and interior drainages. Spotting from torching vine ladders and slash piles could extend out 10' or more, a

careful watch of burning debris along the firelines is warranted. Interior ignition will be used to speed burnout. Two igniters will move into the unit in a prearranged plan igniting along interior drainages and ringing the east and west portions of the unit. It could take up to 1 hour to ring the unit and 2 hours to ignite the interior.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

The pyrotechnic production area is directly north of the unit. Previous burns have set off their fire alarms. The built up (cantonment) area of the base is 1.0 miles north of the unit.

2 mile screen:
Missouri-Pacific railroad 0.5 miles west.
Industrial Park 0.1 miles south.
Town of White Hall 1.5 miles northwest.
Highway 365 1.5 miles west.
City of Pine Bluff 2.0 miles south.
Highway 270 2.0 miles south

5 mile screen:

Highway 65 (interstate quality) 3 miles south and west.
Built-up area of Pine Bluff 3.5 miles southeast.
Residential areas 4.0 miles.
Highway 104 5 miles west.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 3 - 5 allow for good lift and dispersal of smoke during daylight hours. This unit has a deep litter and duff layer and many slash piles that will produce a lot of smoke under dry conditions. Interior ignition will be used to speed burnout. Under good lift and dispersal conditions any wind direction is acceptable. Built-up areas to the south and west, including major highways, could be impacted during days with poor dispersal conditions. Under category 3 or 5 days winds from the south or west would disperse smoke over the base and Arkansas River. Smoke ahead signs will be placed along the paved road directly north of the unit.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justification for exemption:

Fire shelters are not required. This unit will be ignited from the black with a ring fire technique by personnel carrying waterpacks. All lines are accessible by ATV and Pumper. The unit is surrounded on all sides, except the handline, by wide, paved or dirt roads (12' to 50' wide) which are safe areas. The handline runs through FM9 and fire intensity will be low with moderate rates of spread. Secondary control lines ring the entire management unit and are accessible by pumper and ATV.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	10	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	5	TNC
pulaski	4	TNC
chainsaw	2	TNC
ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 90 minutes.
Interior ignition: 120 minutes.
Spreading fire: 45 minutes.

Total duration: 4 ¼ hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The western three-quarters of the north fireline is a 10'-wide ATV trail/logging road which is adjacent to FM9, FM2, and FM12. The eastern one-quarter of the north line is made up of a 200 yard – long, 8'-wide handline (cut and leaf-blown) through FM9, and about a 200 yard – long stretch of paved road, which is 25'-wide with additional 20'-wide mowed right of ways. The east line is a 15'-wide dirt road adjacent to FM9. The south fireline is a 15'-wide dirt road adjacent to FM9, railroad tracks, and a factory. The west line is a 15'-wide dirt road adjacent to FM9, a bayou, and a large pond. All lines are ATV accessible, and all lines except the handline are pumper accessible. Snags near the firelines will be removed or raked around.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. The backfire will be allowed to burn in to form a secure black line. In FM9 stripping will likely be needed for form a secure blackline. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. Interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumpers with radios will be staged along downwind roads. Crew will patrol firelines with waterpacks and rakes. Two ATV's with water will be available for patrol.

Fire sensitive: none

Contingencies (safety zones, escape routes, secondary control lines, escape response):

The roads surrounding the unit, the bayou and creek, and areas blackened by fire are all safety zones. The roads surrounding the unit can be utilized as escape routes, as well as following the creek south to the larger Caney Bayou.

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM9 are controllable by raking and blowing in narrow firelines if rates of spread are slow. An escape to the north (burned in the spring of 2000) can be controlled by blowing in firelines or by backfiring off of the base road and old fireline to the west. Any escape which gets over this road will require assistance from the base fire department, and a security fence will inhibit control measures. An escape to the south or east can be controlled by direct attack and backfiring from roads to the east or the train tracks to the south. An escape into the forested area to the west (burned in the spring of 1999) can be controlled by blowing in firelines, or backfiring off of the base dirt road to the south and west, and the paved base road to the north. Two ATV access trails have been cut to the south to allow quick access, if needed, to the rail tracks and the factory to the south.

In the event of a large escape that cannot be contained with hand tools or the pumper(s), the PBA base fire department will be called in for assistance.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of large pine trees. Crew should be ready for sharp flare-ups. Slash piles can be expected to burn with high intensity. The drainages have vine tangles in places and seepage areas that are mucky. Large snags, downed trees, and cottonmouths are extant in the unit. Interior igniters will have to watch for hanging ice storm – damaged limbs and "widow-makers".

Mop-up:

Mop-up smoldering material within 50' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planner:

Mike Melnechuk/Assistant Land Steward _____
signature and date

Reviewer:

Douglas Zollner/Dir. Cons. Sci. _____
signature and date

Fire Manager:

Scott Simon/Dir. Stew. _____
signature and date

PBA BIG PINE UNIT

HEADFIRE
DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
15% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 60.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- .0
9--DIRECTION OF WIND VECTOR .0
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM THE WIND VECTOR

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	22.	33.	44.
6.0	2.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	4.	8.	13.	19.	26.

FUEL MODEL 2 (15%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	11.	31.	63.	104.	156.	216.
6.0	10.	28.	56.	93.	138.	192.
8.0	9.	26.	51.	85.	127.	176.
10.0	8.	23.	46.	76.	114.	158.
12.0	6.	18.	36.	61.	90.	125.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	57.	107.	171.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	29.	55.	88.	127.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (15%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	105.	300.	600.	996.	1485.	2062.
6.0	87.	250.	499.	829.	1235.	1715.
8.0	77.	222.	444.	738.	1099.	1527.
10.0	65.	187.	373.	619.	922.	1281.
12.0	43.	123.	246.	409.	610.	847.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.6	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.8	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (15%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.8	6.2	8.5	10.8	12.9	15.1
6.0	3.5	5.7	7.8	9.9	11.9	13.8
8.0	3.3	5.4	7.4	9.4	11.3	13.1
10.0	3.1	5.0	6.9	8.7	10.4	12.1
12.0	2.5	4.1	5.7	7.2	8.6	10.0

BACKFIRE
DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
15% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 60.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- .0
9--DIRECTION OF WIND VECTOR .0
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM THE WIND VECTOR

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (15%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	2.	3.	3.	3.	3.
6.0	1.	2.	2.	3.	3.	3.
8.0	1.	2.	2.	3.	3.	3.
10.0	1.	2.	2.	2.	2.	3.
12.0	1.	1.	2.	2.	2.	2.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (15%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	15.	22.	26.	29.	32.	33.
6.0	13.	18.	22.	24.	26.	28.
8.0	11.	16.	19.	22.	23.	25.
10.0	9.	13.	16.	18.	20.	21.
12.0	6.	9.	11.	12.	13.	14.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (15%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.6	1.8	2.0	2.1	2.2	2.3
6.0	1.4	1.7	1.9	2.0	2.0	2.1
8.0	1.4	1.6	1.8	1.9	1.9	2.0
10.0	1.3	1.5	1.6	1.7	1.8	1.8
12.0	1.0	1.2	1.3	1.4	1.5	1.5

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Triplets Bluff-Phillips Creek; Pine Bluff Arsenal.
Location: T4S, R10W, sections 22 and 27; Jefferson County, Arkansas.
Unit: Dud Unit - 145 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

First call the base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834 to report an escape.

Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

Charles Becker informs Base personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure
oak-pine litter	9	42% - 61 acres	flat *	sheltered
pine savanna/grass	2	34% - 49 acres	flat	exposed
oak riparian/bottoms	8	24% - 35 acres	flat *	sheltered

* A 30'-40' escarpment separates the upland (FM9) forest from the riparian-bottoms (FM8) along Phillips Creek.

Fire Unit Narrative Description:

This somewhat triangular unit comprises the Phillips Creek section of the Phillips Creek-Tripletts Bluff old growth area west of the Bombing Mat. Phillips Creek is a perennial stream with a wide, flat bottom and a 30'-40' escarpment running west to east through the unit separating the upland woodlands into two sections. The northwest fireline is a 20'-wide gravel road through FM9 with a grassy 15'-wide right-of-way on each side of the road. The east fireline is a 16'-wide paved road (north half) and mown and blown handline (south half) adjacent to the Bombing Mat. Tripletts Bluff to the east was burned in the spring of 2001. The south fireline is a 16'-wide dirt road adjacent to FM9 and an old field grown up with weeds, south of the line is the rifle range and a large field of Johnson grass (FM3). A portion of the south fireline runs along Phillips Creek. The sections of this unit adjacent to the Bombing Mat may have unexploded ordnance on the surface or buried in the soil. A large pile of wooden pallets is stored on the Bombing Mat (see amp), special attention will be given this area depending on wind direction.

Oak-pine/litter: Oak-pine/leaf litter (FM9) covers all the uplands adjacent to Phillips Creek. Where pine needles predominate this area will burn on the hot side of FM9. The ground cover is mostly oak leaves, pine needles, and non-continuous grass 20" tall. Pine needle draped vine tangles and large snags are extant. At the edges small pines, shrubs, and herbaceous vegetation is thicker and often draped with pine needles. This area was prescribed burned in the spring of 1999. Consequently fuel loads are relatively low and vines and shrubs much reduced. This section of the unit is easily traversable but mostly within the dudded area. McCoy road has had right-of-way maintenance and scattered and piled slash are extant

Pine savanna/grass: The pine savanna (FM2) portion of the unit was not included in the spring 1999 prescribed burn. The pine trees are young and 20'-tall. Although this section has burned in the past, fuels loads are high with 3'-tall grasses, shrubs, needle-draped vines, and young pine regeneration. There are many standing snags due to the winter/2000 ice storms. Most of the pine savanna is directly adjacent to the Bombing Mat. The FM2 section of the unit along the south line has virtually no trees.

Hardwood bottoms: The hardwood bottoms have a thick, moist duff layer (FM8). Seep vegetation (ferns, carex, shrubs, cane, vines) is present. Much of the bottoms will burn slowly

and incompletely, or not at all, except under drought conditions. Much of the bottoms did burn during the spring 1999 prescribed burn.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological Stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. The maintenance and enhancement of fire-dependent rare species populations. Long-term reduction and maintenance of fuel loads n a fire safe landscape.

Specific Burn Unit Objectives:
75%-90% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.
midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		180° - 225°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%

atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

	FM9 (42%-61 ac.)	FM8 (24%-35 ac.)	FM2 (34%-49 ac.)
Maximum behavior			
headfire flame length (ft)	6.5	2.0	16.0
backfire flame length (ft)	1.0	0.3	2.4
hf rate of spread (ch/hr)	44.0	7.0	244.0
bf rate of spread (ch/hr)	1.0	0.0	4.0
Minimum behavior			
headfire flame length (ft)	1.3	0.6	2.8
backfire flame length (ft)	0.5	0.2	1.1
hf rate of spread (ch/hr)	2.0	1.0	7.0
bf rate of spread (ch/hr)	0.0	0.0	1.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine and oak leaf litter at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged. Stripping may be needed to secure an adequate blackline in FM9 and to ignite a continuous line in disturbed areas such as the old field along the south line. 20' of blackline is adequate with secured corners when beginning flanking ignition.

Ignition will continue along flanking lines. Fire should pull into the unit with 2' – 5' flame lengths in FM9. In FM2 fire will move into the unit with 5' – 7' flame lengths. Torching of vine ladders, and individual pine trees can be expected. Downed woody debris and slash will become engaged and areas of intense fire may occur along the firelines. Smoke production can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 15' or more. Headfire will move quickly to burnout in FM2. In FM9 headfire will move more slowly. Flame lengths in

FM2 will be 10' – 15' with torching of vine ladders, pine reproduction, and individual trees. Flame lengths in FM9 will be 5' – 7'. Slash piles that become engaged will burn intensely with flame lengths of 20'+. The fire is likely to be continuous, stopping only at low wet areas and the ravines with FM8. Spotting from torching vine ladders and slash piles could extend out 30' or more, a careful watch of burning debris along the firelines is warranted. In FM8 a slow fire will finger its way into the bottoms and go out.

It could take up to 1 hour to ring the unit and 3 hours to achieve burn out. All igniters must be familiar with the unit before ignition begins. Interior ignition can be used only non dudded areas; mostly south of Phillips Creek.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

2 mile screen:
McCoy Road adjacent.
Incinerator construction 0.5 miles north.
Arsenal facilities are 1.5 miles south and west.
Rifle range directly south.

5 mile screen:
NCTR; 3.0 miles northwest.
Highway 365; 3.0 miles west and south.
Missouri Pacific railroad; 3.0 miles west and south.
Town of White Hall; 4.0 miles southwest.
Highway 104; 4.0 miles west.
Highway 65; 4.5 miles southwest.
Lock and Dam Number 3; 5.0 miles north.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. Most of this unit has a shallow litter and duff layer but the pine savanna and slash will produce a lot of smoke under dry conditions. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. Arsenal facilities and built-up areas to the west and southwest, including major highways, could be impacted during days with poor dispersal conditions. Under category 2 or 5 days winds from the south or west would disperse smoke over the Arkansas River and agricultural lands to the west.

McCoy road (the northeast fireline) has relatively heavy traffic at certain times of the day due to the incinerator construction. Smoke ahead signs are mandatory. If heavy smoke is put across the road contact Base Security for assistance in halting or direcing traffic.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	10	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC
ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 60-90 minutes.
Interior ignition: 90 minutes.
Spreading fire: 180 – 240 minutes.
Mop-up: none.
Total duration: 4 – 6 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The northwest fireline is a 20'-wide gravel road. Check the bridge to make sure there are no continuous fuels. The north half of the east fireline is a 16'-wide paved road adjacent to Tripletts Bluff, powerpoles are extant, the south half of the east fire line a 16' -wide mown and raked handline around the Bombing Mat that hooks into Phillips Creek. There are several pieces of equipment in the field north of the Bombing Mat and in the Creek adjacent to the settling pond. The equipment will be treated like phone boxes and power poles with 10' diameter mown and raked circles. The south fireline is a 16'-wide dirt road, the shoulders may need to be mown, the south line hooks into Phillips Creek with a 6'-wide blown and raked handline. All culverts need to be checked for continuous fuels and woody debris deposited by beaver. All lines are ATV accessible. The pumper cannot access the fireline along Phillips Creek. Snags near the firelines will be removed or raked around.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. The backfire will be allowed to burn in to form a secure black line (20'-wide in FM2 and 9). In FM9 and the old field along the south line, stripping will likely be needed to form a secure blackline. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. Interior ignition cannot be used in this unit because of the possibility of unexploded ordinance.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be staged along the downwind road. Crew will patrol backfire lines and flanks with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to the pallet pile depending on wind direction.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are relatively slow. A major escape to the north will require backfiring from the roads that surround the area or blowing in firelines and backfiring. A major escape to the west will be allowed to burnout along the Arkansas River. An escape to the southeast into the large field of Johnson grass will not be easily controlled by direct attack. Call the Base Fire Department for assistance and backfire from roads that surround the fields. If any material on the Bombing Mat becomes engaged crew will back off and wait the assistance of the Base Fire Department.

Crew hazards:

It is possible that unexploded and buried ordinance is extant in the unit. Crew will not enter the unit during the burn. Although the area has been swept and burned previously without incident, caution is advised. Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Large snags, downed trees, and cottonmouths are extant in the unit.

Mop-up:

There will be no mop-up except where snags threaten the firelines. Do not disturb any extraneous pieces of metal on the surface or imbedded in the ground. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____
signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____
signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____
signature and date

PBA – Dud Unit

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.7	2.0	2.2	2.3	2.3	2.4
6.0	1.5	1.8	2.0	2.1	2.2	2.2
8.0	1.5	1.7	1.9	2.0	2.0	2.1
10.0	1.4	1.6	1.7	1.8	1.9	1.9
12.0	1.1	1.3	1.5	1.5	1.6	1.6

HEADFIRE

DIRECT
1--FUEL MODEL ---------- 8 -- CLOSED TIMBER LITTER
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 8.0
4--100-HR FUEL MOISTURE, % 9.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 25.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	2.	3.	5.	6.	7.*
6.0	1.	2.	3.	4.	5.*	5.*
8.0	1.	1.	2.	3.	4.*	4.*
10.0	1.	1.	2.	3.	3.*	3.*
12.0	1.	1.	2.	3.*	3.*	3.*

* MEANS YOU HIT THE WIND LIMIT.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.	8.	13.	18.	25.	26.*
6.0	3.	6.	10.	14.	17.*	17.*
8.0	3.	5.	8.	11.	12.*	12.*
10.0	2.	4.	7.	9.	9.*	9.*
12.0	2.	4.	6.	8.*	8.*	8.*

* MEANS YOU HIT THE WIND LIMIT.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.9	1.2	1.4	1.7	2.0	2.0*
6.0	.8	1.0	1.3	1.5	1.6*	1.6*
8.0	.7	.9	1.2	1.4	1.4*	1.4*
10.0	.6	.9	1.1	1.3	1.3*	1.3*
12.0	.6	.8	1.0	1.2*	1.2*	1.2*

* MEANS YOU HIT THE WIND LIMIT.

BACKFIRE

DIRECT
1--FUEL MODEL ---------- 8 -- CLOSED TIMBER LITTER
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 8.0
4--100-HR FUEL MOISTURE, % 9.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 25.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	0.	0.	0.	0.	0.
6.0	0.	0.	0.	0.	0.	0.
8.0	0.	0.	0.	0.	0.	0.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	0.	0.	0.	0.

8.0	I	0.	0.	0.	0.	0.	0.
10.0	I	0.	0.	0.	0.	0.	0.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	.3	.3	.3	.3	.3	.3
6.0	.3	.3	.3	.3	.3	.3
8.0	.3	.3	.3	.3	.3	.3
10.0	.2	.2	.2	.2	.2	.2
12.0	.2	.2	.2	.2	.2	.2

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Pine Bluff Arsenal; Production Area; Bomb Storage Units.
Location: T5S, R10W, sections 11 and 12; Jefferson County, Arkansas.
Unit: Bomb Storage Units (1-16; A-D) - 208 acres; 16 units are 12 acres, 4 units are 4 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

To report an escape, first call the Base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834. Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

None; Charles Becker informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure

pine savanna/slash	2	100% - 208 acres	flat	exposed

Fire Unit Narrative Description:

The Bomb Storage Units comprise an upland, north of the Refuge Woods, within the Production Area. These 20 units are flat. Paved or gravel roads surround each unit and fire hydrants are extant throughout. Sixteen of the units contain 4 bomb storage facilities each. The 4 smaller units do not contain facilities. The storage facilities are surrounded by mown grass and are constructed of non-flammable materials. The units are wet in the spring due to poor drainage. Scattered slash is extant due to the Winter 2000 ice storms and spring 2001 salvage. The surrounding woodlands are a mix of FM9 and FM2. Many power poles line the roads. All firelines are accessible to the pumper. the units. The production area has a chain link fence and guard shack at the gate, usually only one is open.

Pine savanna/slash: The pine savanna was heavily impacted by the ice storm and now comprises scattered to sparse loblolly pine. The trees are relatively small, to 40'. The understory is grass and weeds with abundant re-sprouts and both scattered and piles of slash. Fuel loads are relatively heavy and will likely produce abundant smoke.

6. PRESCRIBED BURN RATIONALE

Type of burn: Fuel reduction and ecological stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. The maintenance and enhancement of fire-dependent rare species populations. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
65%-85% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.
midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.

overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		180° - 360°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

	FM9 (67%-125 ac.)	FM8 (25%-40 ac.)	FM2 (8%-15 ac.)
Maximum behavior			
headfire flame length (ft)	6.5	2.0	16.0
backfire flame length (ft)	1.0	0.3	2.4
hf rate of spread (ch/hr)	44.0	7.0	244.0
bf rate of spread (ch/hr)	1.0	0.0	4.0
Minimum behavior			
headfire flame length (ft)	1.3	0.6	2.8
backfire flame length (ft)	0.5	0.2	1.1
hf rate of spread (ch/hr)	2.0	1.0	7.0
bf rate of spread (ch/hr)	0.0	0.0	1.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine needles and grass at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in disturbed areas. Ten feet of blackline is adequate.

Ignition will continue along flanking lines. Fire should pull into the unit with 5' – 7' flame lengths. Torching of vine ladders can be expected. Downed woody debris and slash will become engaged and areas of intense fire may occur along the firelines. Smoke can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 10' or more. Headfire will move quickly to burnout in FM2. Flame lengths in FM2 will be 10' – 15' with torching of vine ladders common. Slash piles that become engaged will burn intensely with flame lengths of 20'+. The fire is likely to be continuous, stopping only at low wet areas. Spotting from torching vine ladders and slash piles could extend out 30' or more, a careful watch of burning debris along the firelines is warranted.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

<u>2 mile screen:</u>
The Production Area is adjacent
Missouri-Pacific railroad - 0.25 miles west.
Industrial Park - 0.25 miles south.
Town of White Hall - 1.0 miles west.
Highway 365 - 1.5 miles west.
City of Pine Bluff - 2.0 miles south.
Highway 270 - 2.0 miles south

<u>5 mile screen:</u>
Interstate 540 - 3 miles south and west.
Built-up area of Pine Bluff - 3.5 miles southeast.
Residential areas - 4.0 miles.

Highway 104 - 5 miles west.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. These are small units and although each unit could produce abundant smoke the total is going to be small and unlikely to impact areas outside the Arsenal. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. Built-up areas to the south and west, including major highways, could be impacted during days with poor dispersal conditions. Under category 2 or 5 days winds from the south or west would disperse smoke over the base and Arkansas River.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC

ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 30 minutes.
Spreading fire: 30 minutes.
Mop-up: 60 minutes.

Total duration: 2 hours for each unit.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

All north firelines are 16' paved or gravel roads. The bomb storage facilities have mown grass 20'-wide around the buildings. All lines are ATV and pumper accessible. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. Stripping will likely be needed to form a secure blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM2 is adequate. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. If necessary, interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be patrol along the downwind road. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to the bomb storage facilities.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the north will require assistance from the Base Fire Department and backfiring from the roads; a security fence will inhibit control measures. A major escape to the east can be controlled by backfiring off the road along the railroad tracks.

An escape to the south can be controlled by direct attack and backfiring from roads. An escape into the forested area to the west can be controlled by backfiring from surrounding roads and skid trails.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Snags, downed trees, slash piles, and cottonmouths are extant in the unit.

Mop-up:

Mop-up smoldering material within 20' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____

signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____

signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____

signature and date

BOMB STORAGE UNITS

HEADFIRE

DIRECT
1--FUEL MODEL ---------- 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 60.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- .0
9--DIRECTION OF WIND VECTOR .0
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM THE WIND VECTOR

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	11.	31.	63.	104.	156.	216.
6.0	10.	28.	56.	93.	138.	192.
8.0	9.	26.	51.	85.	127.	176.
10.0	8.	23.	46.	76.	114.	158.
12.0	6.	18.	36.	61.	90.	125.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	105.	300.	600.	996.	1485.	2062.
6.0	87.	250.	499.	829.	1235.	1715.
8.0	77.	222.	444.	738.	1099.	1527.
10.0	65.	187.	373.	619.	922.	1281.
12.0	43.	123.	246.	409.	610.	847.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.8	6.2	8.5	10.8	12.9	15.1
6.0	3.5	5.7	7.8	9.9	11.9	13.8
8.0	3.3	5.4	7.4	9.4	11.3	13.1
10.0	3.1	5.0	6.9	8.7	10.4	12.1
12.0	2.5	4.1	5.7	7.2	8.6	10.0

BACKFIRE

DIRECT
1--FUEL MODEL ---------- 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 2.0 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 60.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- .0
9--DIRECTION OF WIND VECTOR .0
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM THE WIND VECTOR

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
2.0	2.	3.	3.	4.	4.	4.
4.0	2.	2.	3.	3.	3.	3.
6.0	1.	2.	2.	3.	3.	3.
8.0	1.	2.	2.	3.	3.	3.
10.0	1.	2.	2.	2.	2.	3.
12.0	1.	1.	2.	2.	2.	2.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
2.0	22.	30.	37.	41.	45.	47.
4.0	15.	22.	26.	29.	32.	33.
6.0	13.	18.	22.	24.	26.	28.
8.0	11.	16.	19.	22.	23.	25.
10.0	9.	13.	16.	18.	20.	21.
12.0	6.	9.	11.	12.	13.	14.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
2.0	1.8	2.2	2.4	2.5	2.6	2.6
4.0	1.6	1.8	2.0	2.1	2.2	2.3
6.0	1.4	1.7	1.9	2.0	2.0	2.1
8.0	1.4	1.6	1.8	1.9	1.9	2.0
10.0	1.3	1.5	1.6	1.7	1.8	1.8
12.0	1.0	1.2	1.3	1.4	1.5	1.5

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Production Area; Pine Bluff Arsenal.
Location: T5S, R10W, section 14; Jefferson County, Arkansas.
Unit: McCoy Road Unit - 23 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

First call the base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834 to report an escape. Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

None; Charles Becker informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure

oak-pine litter	9	100% - 23 acres	flat - none	sheltered

Fire Unit Narrative Description:

This rectangular unit comprises an area between McCoy Road and the Production Area security fence. The unit has a 30'-wide paved road to the east, equipment storage area to the north, a mown security area along the Production Area fence to the east, and a railroad and right-of-way to the south. Surrounding fuels are FM9 or FM2 with Arsenal facilities to the east. Two small ditches cross the unit. In several areas equipment is stored outside various building and in the storage area directly north of the unit. All firelines are accessible to the pumper or ATV but the east line would need to be patrolled from within the Production Area. It is recommended that the pumper remain on the paved surfaces.

Oak-pine/litter: Most of the unit is covered by pines and pine needle litter (FM9). This area will burn on the hot side of FM9. The southern 2/3 's of the unit is an old (40 years) plantation. The ground cover is mostly pine needles, shrubs and sprouts, pine regeneration, and non-continuous grass 20" tall. Pine needle draped vine tangles and large snags are extant. At the edges of the unit shrubs and herbaceous vegetation is thicker and often draped with pine needles.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological Stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
65%-85% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.
midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		225° - 315°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

FM9 (100%-23 ac.)	
Maximum behavior	
headfire flame length (ft)	6.5
backfire flame length (ft)	1.0
hf rate of spread (ch/hr)	44.0
bf rate of spread (ch/hr)	1.0
Minimum behavior	
headfire flame length (ft)	1.3
backfire flame length (ft)	0.5
hf rate of spread (ch/hr)	2.0
bf rate of spread (ch/hr)	0.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire along the interface between the mown area and forested section of the unit or directly off the road if the right-of-way will burn. The backfire will move into the unit through pine and oak leaf litter at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in FM9 and to ignite a continuous line in disturbed areas. Ten feet of blackline is adequate in FM9. Ignition will continue along flanking lines. Fire should pull into the unit with 2' – 5' flame lengths in FM9. Smoke can be expected to be heavy due to deep duff and litter accumulations.

The fire will be rung as soon as the flanking fires have moved in 15' or more. In FM9 headfire will move at a moderate pace under dry conditions, interior ignition can be used to speed burnout. Flame lengths in FM9 will be 5' – 7'. The fire is likely to be continuous, stopping only at low wet areas and the ravines. Spotting from torching vine ladders could extend out 30' or more, a careful watch of burning debris along the firelines is warranted.

For interior ignition 1 or 2 igniters will move into the unit in a prearranged plan. It could take up to 1 hour to ring the unit and 1 hour to ignite the interior. All igniters must be familiar with the unit before ignition begins.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

<u>2 mile screen:</u>
Missouri-Pacific railroad - 0.25 miles west.
Industrial Park - 0.25 miles south.
Town of White Hall - 1.0 miles west.
Highway 365 - 1.5 miles west.
City of Pine Bluff - 2.0 miles south.
Highway 270 - 2.0 miles south

<u>5 mile screen:</u>
Interstate 510 - 3 miles south and west.
Built-up area of Pine Bluff - 3.5 miles southeast.
Residential areas - 4.0 miles.
Highway 104 - 5 miles west.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. Heavy smoke along McCoy road may require the assistance of Base Security to direct traffic (easterly winds). In previous burns the smoke has set off alarms in the Production Area nearby. Built-up areas to the south and west, including major highways, could be impacted during days with poor dispersal conditions but this unit is small and the duration will be short. Under category 2 or 5 days winds from the south or west would disperse smoke over the base and Arkansas River.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC

ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 60 minutes.
Interior ignition: 60 minutes.
Spreading fire: 90 minutes.
Mop-up: 120-180 minutes

Total duration: 4 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The west fireline is a 30'-wide paved road, the north line is an equipment storage area, the east line is a mown handline along the Production Area security fence, the south fireline is a 15'-wide railroad right-of-way. All culverts need to be checked for continuos fuels and woody debris deposited by beaver. All lines are ATV and pumper accessible, the east line patrol would be inside the Production Area. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. In FM9 stripping will likely be needed to secure the blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM9 is adequate. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. Interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be available for patrol along the downwind road. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to possible spotting into the Production Area, near buildings, equipment, or into the mown rights-of-way.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the east may require backfiring from surrounding

roads, call the pumper for assistance. Any fire that ignites equipment or building requires the assistance of the Base Fire Department.
Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of large pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Large snags, downed trees, slash piles, alligators, and cottonmouths are extant in the unit. Care must be taken along the paved road (west line) as it could be obscured with smoke. Various explosive and toxic materials are stored in the Production Area.

Mop-up:

Mop-up smoldering material within 20' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____
signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____
signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____
signature and date

PBA – McCoy Road Unit

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.7	2.0	2.2	2.3	2.3	2.4
6.0	1.5	1.8	2.0	2.1	2.2	2.2
8.0	1.5	1.7	1.9	2.0	2.0	2.1
10.0	1.4	1.6	1.7	1.8	1.9	1.9
12.0	1.1	1.3	1.5	1.5	1.6	1.6

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Refuge Woods; Pine Bluff Arsenal.
Location: T5S, R10W, sections 13 and 14; Jefferson County, Arkansas.
Unit: Pond unit - 185 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

First call the base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834 to report an escape.

Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

None; Charles Becker informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure
oak-pine litter	9	67% - 125 acres	slightly south – 1%	sheltered
oak riparian	8	25% - 45 acres	flat	sheltered
pine savanna/slash	2	8% - 15 acres	flat	partial

Fire Unit Narrative Description:

This unit comprises the west end of the Refuge Woods, north of the ponds, and includes all of the designated old growth area. The unit gently slopes to the south. A small ephemeral creek bisects the unit from north to south. The south end of the unit is wet and often has standing water due to beaver ponds. A shrubby, 20'-wide right-of-way runs through the north end of the unit parallel to the north fireline. The south fireline is a 20'-wide gravel road adjacent to a ponded area with dry grass on the levees. The west fireline is a 20'-wide gravel road through FM9. The north fireline is a 25'-wide paved road with 10'-wide mown right-of-way on each side adjacent to an old field that has grown up in shrubs and small trees (FM 3). The east fireline is a 16'-wide mown and raked handline through FM9 and FM8. Several power poles and phone boxes are scattered along the north and east firelines. All firelines are accessible to the pumper. Under wet conditions the pumper could get bogged down along the east fireline. The production area north of the unit has a chain link fence around it and a new gate that is usually locked.

Oak-pine/litter: Most of the unit is covered by oak-pine/leaf litter (FM9). Where pine needles predominate this area will burn on the hot side of FM9. The ground cover is mostly oak leaves, pine needles, and non-continuous grass 20" tall. Pine needle draped vine tangles and large snags are extant. At the edges shrubs and herbaceous vegetation is thicker and often draped with pine needles. Fuel loads are relatively low due to the prescribed burn in the spring of 1999.

Oak riparian and bottoms: The hardwood bottoms have a thick, moist duff layer (FM8). Seep vegetation (ferns, carex, shrubs, and vines) and oak flats are present. Much of the bottoms will burn slowly and incompletely, or not at all, except under drought conditions.

Pine Savanna/slash: Some 15 acres at the northeast corner was heavily thinned in the summer of 1999. The understory is grass with abundant re-sprouts and both scattered and piles of slash. Fuel loads are relatively heavy and will likely produce abundant smoke.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological Stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. The maintenance and enhancement of fire-dependent rare species populations. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
65%-85% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.
midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		225° - 315°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

	FM9 (67%-125 ac.)	FM8 (25%-40 ac.)	FM2 (8%-15 ac.)
Maximum behavior			
headfire flame length (ft)	6.5	2.0	16.0
backfire flame length (ft)	1.0	0.3	2.4
hf rate of spread (ch/hr)	44.0	7.0	244.0
bf rate of spread (ch/hr)	1.0	0.0	4.0
Minimum behavior			
headfire flame length (ft)	1.3	0.6	2.8
backfire flame length (ft)	0.5	0.2	1.1
hf rate of spread (ch/hr)	2.0	1.0	7.0
bf rate of spread (ch/hr)	0.0	0.0	1.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

Due to the size of the unit and expected heavy smoke production, ignition will begin as early in the day as possible. A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine and oak leaf litter at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in FM9 and to ignite a continuous line in disturbed areas. Ten feet of blackline is adequate in FM9. The backfire is unlikely to ignite in FM8 and no blackline is needed.

Ignition will continue along flanking lines. Fire should pull into the unit with 2' – 5' flame lengths in FM9. In FM2 fire will move into the unit with 5' – 7' flame lengths. Torching of vine ladders can be expected. Downed woody debris and slash will become engaged and areas of intense fire may occur along the firelines. In FM8 flanking fire will be sporadic and flame lengths less than 1'. Smoke can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 15' or more. Headfire will move quickly to burnout in FM2. In FM9 headfire will move more slowly and interior ignition can be used to speed burnout. Flame lengths in FM2 will be 10' – 15' with torching of vine ladders common. Flame lengths in FM9 will be 5' – 7'. Slash piles that become engaged will burn intensely with flame lengths of 20'+. The fire is likely to be continuous, stopping only at

low wet areas and the ravines with FM8. Spotting from torching vine ladders and slash piles could extend out 30' or more, a careful watch of burning debris along the firelines is warranted. In FM8 a slow fire will finger its way into the bottoms and go out.

The south line must be ignited interior to the road where the beaver ponds are located (see map). For interior ignition 1 or 2 igniters will move into the unit in a prearranged plan igniting along interior drainages. It could take up to 1 hour to ring the unit and 2 hours to ignite the interior. All igniters must be familiar with the unit before ignition begins.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

2 mile screen:
Missouri-Pacific railroad - 0.25 miles west.
Industrial Park - 0.25 miles south.
Town of White Hall - 1.0 miles west.
Highway 365 - 1.5 miles west.
City of Pine Bluff - 2.0 miles south.
Highway 270 - 2.0 miles south

5 mile screen:
Interstate 540 - 3 miles south and west.
Built-up area of Pine Bluff - 3.5 miles southeast.
Residential areas - 4.0 miles.
Highway 104 - 5 miles west.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. This unit was burned in the spring of 1999 and fuels are much reduced however, abundant smoke will be produced under dry conditions. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. Built-up areas to the south and west, including major highways, could be impacted during days with poor dispersal conditions. Under category 2 or 5 days winds from the south or west would disperse smoke over the base and Arkansas River.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC
ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 60 minutes.
Interior ignition: 90 minutes.
Spreading fire: 90 minutes.
Mop-up: 120-180 minutes

Total duration: 4 – 6 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The north fireline is a 25'-wide paved road with 10'-wide mown rights-of-way. The west fireline is a 16'-wide logging road that will be cut, raked, and blown. The south fireline is a 20'-wide gravel road. The east fireline is a 20'-wide gravel road. All culverts need to be checked for continuos fuels and woody debris deposited by beaver. All lines are ATV and pumper accessible. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. If possible, ignition along the north line will be in the grassy right-of-way along the road, if the right-of-way is not burnable ignition will be along the right-of-way woods interface. In FM9 and FM 8 stripping will likely be needed for form a secure blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM2 and 9 is adequate. FM8 may not burn and no blackline is needed. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. Interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be available for patrol along the downwind road. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to possible spotting across the paved road into the production area.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the north will require assistance from the base fire department and backfiring from the roads; a security fence will inhibit control measures. A major escape to the east can be controlled by backfiring off the road along the railroad tracks. An escape to the south can be controlled by direct attack and backfiring from roads surrounding the ponds. An escape into the forested area to the west can be controlled by backfiring from surrounding roads and skid trails.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of large pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Large snags, downed trees, slash piles, alligators, and cottonmouths are extant in the unit. Care must be taken along the paved road (north line) as it has been obscured with smoke in previous burns and is frequently traveled at certain times of the day.

Mop-up:

Mop-up smoldering material within 50' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____

signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____

signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____

signature and date

PBA – Pond Unit

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)						
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)						
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.7	2.0	2.2	2.3	2.3	2.4
6.0	1.5	1.8	2.0	2.1	2.2	2.2
8.0	1.5	1.7	1.9	2.0	2.0	2.1
10.0	1.4	1.6	1.7	1.8	1.9	1.9
12.0	1.1	1.3	1.5	1.5	1.6	1.6

HEADFIRE

DIRECT
1--FUEL MODEL ---------- 8 -- CLOSED TIMBER LITTER
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 8.0
4--100-HR FUEL MOISTURE, % 9.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 25.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	2.	3.	5.	6.	7.*
6.0	1.	2.	3.	4.	5.*	5.*
8.0	1.	1.	2.	3.	4.*	4.*
10.0	1.	1.	2.	3.	3.*	3.*
12.0	1.	1.	2.	3.*	3.*	3.*

* MEANS YOU HIT THE WIND LIMIT.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.	8.	13.	18.	25.	26.*
6.0	3.	6.	10.	14.	17.*	17.*
8.0	3.	5.	8.	11.	12.*	12.*
10.0	2.	4.	7.	9.	9.*	9.*
12.0	2.	4.	6.	8.*	8.*	8.*

* MEANS YOU HIT THE WIND LIMIT.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	.9	1.2	1.4	1.7	2.0	2.0*
6.0	.8	1.0	1.3	1.5	1.6*	1.6*
8.0	.7	.9	1.2	1.4	1.4*	1.4*
10.0	.6	.9	1.1	1.3	1.3*	1.3*
12.0	.6	.8	1.0	1.2*	1.2*	1.2*

* MEANS YOU HIT THE WIND LIMIT.

BACKFIRE

DIRECT
1--FUEL MODEL ---------- 8 -- CLOSED TIMBER LITTER
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 8.0
4--100-HR FUEL MOISTURE, % 9.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 25.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	0.	0.	0.	0.	0.
6.0	0.	0.	0.	0.	0.	0.
8.0	0.	0.	0.	0.	0.	0.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	0.	0.	0.	0.

8.0	I	0.	0.	0.	0.	0.	0.
10.0	I	0.	0.	0.	0.	0.	0.

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	.3	.3	.3	.3	.3	.3
6.0	.3	.3	.3	.3	.3	.3
8.0	.3	.3	.3	.3	.3	.3
10.0	.2	.2	.2	.2	.2	.2
12.0	.2	.2	.2	.2	.2	.2

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Pine Bluff Arsenal; Pine Savanna Restoration Area.
Location: T4S, R10W, sections 17; Jefferson County, Arkansas.
Unit: NCTR Unit - 17 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

To report an escape, first call the Base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834. Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
National Center for Toxicological Research; (870) 543-7000; (870) 845-4084.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

None; Charles Becker (Natural Resources Specialist) informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure
pine-oak/litter	9	100% - 17 acres	southeast – 1%	sheltered

Fire Unit Narrative Description:

The triangular NCTR Unit comprises a pine-dominated upland just south of the National Center for Toxicological Research (NCTR). The unit is mostly flat but drops off to the south along Phillips Creek. The south side is often wet. A 25'-wide paved road forms the west boundary south of NCTR, which is separated for the Arsenal by a security fence. The east fireline is a 50'-wide powerline right-of-way. The south fireline is Phillips Creek. The fuels to the north, west, and south are pine-oak/litter (FM9). The fuels to the east are pine savanna with slash (FM2). The east and west firelines are accessible to the pumper. The south fireline is ATV accessible.

Pine-oak/litter: Most of the unit is covered by pines and pine needle litter (FM9). This area will burn on the hot side of FM9. The ground cover is mostly pine needles; sparse shrubs and sprouts, pine regeneration, and non-continuous grass 20" tall is extant. Pine needle draped vine tangles and large snags are extant, as well as some ice damaged areas from the Winter/2001 ice storm. At the edges of the unit shrubs and herbaceous vegetation is thicker and often draped with pine needles.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. The maintenance and enhancement of fire-dependent rare species populations. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
75%-95% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.
midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	Maximum	Minimum	Preferred
wind direction:	any		270° - 90°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

FM9 (100%-17 ac.)	
Maximum behavior	
headfire flame length (ft)	6.5
backfire flame length (ft)	1.0
hf rate of spread (ch/hr)	44.0
bf rate of spread (ch/hr)	1.0
Minimum behavior	
headfire flame length (ft)	1.3
backfire flame length (ft)	0.5
hf rate of spread (ch/hr)	2.0
bf rate of spread (ch/hr)	0.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine needles and grass at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in disturbed areas. Ten feet of blackline is adequate.

Ignition will continue along flanking lines. Fire should pull into the unit with 3' – 5' flame lengths. Torching of vine ladders can be expected. Downed woody debris will become engaged during dry conditions. Smoke production can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 10' or more. Flame lengths in FM9 will be 7' - 8' with sporadic torching of vine ladders. The fire is likely to be continuous, stopping only at low wet areas. Spotting from torching vine ladders could extend out 30' or more, a careful watch of burning debris along the firelines is warranted.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

National Center for toxicological Research; directly north.
Incinerator Road; 0.3 miles south.
Highway 365; 1.75 miles southeast.
Incinerator Construction Area; 2.0 miles east.
Highway 104; 2.0 miles south
Base facilities; 2.5 miles south.
I 510; 3.0 miles west.
Residential area (Jefferson); 3.0 miles northwest.
Lock and Dam #3; 3.5 miles north.
Town of White Hall; 4.0 miles south.

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. This is a small unit and although smoke production will be heavy it will also be brief. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. The Fire Leader should be aware that the Incinerator Road to the south is heavily traveled at certain times of the day. Smoke ahead sings are available if necessary and Base Security will direct traffic if requested. A south wind would directly impact NCTR and would be excluded during days with poor lift and dispersal.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC
ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 45 minutes.
Spreading fire w/ Interior ignition: 45 minutes.
Mop-up: 60 minutes.

Total duration: 2 – 3 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The west fireline is a 25'-wide paved road. The east fire line is a 50'-wide, mown, right-of-way with a 6'-wide raked and blown handline. The south fireline is Phillips Creek with an ATV accessible line just to the north. The west and east firelines are pumper accessible. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. Stripping will likely be needed to form a secure blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM9 is adequate. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. If necessary, interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be patrol along the downwind road. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to NCTR if burning with a south wind and the pine savanna to the east with a west wind.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the north (NCTR) will require assistance from the Base Fire Department. A major escape to the east may require assistance from the Base Fire Department and backfiring from the roads and rights-of-way. An escape to the south can be controlled by direct attack and backfiring from roads.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Snags, downed trees, slash piles, and cottonmouths are extant in the unit.

Mop-up:

Mop-up smoldering material within 20' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____
signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____
signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____
signature and date

PBA – NCTR Unit

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT						(V4.4)
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (20%)

FLAME LENGTH, FT						(V4.4)
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.7	2.0	2.2	2.3	2.3	2.4
6.0	1.5	1.8	2.0	2.1	2.2	2.2
8.0	1.5	1.7	1.9	2.0	2.0	2.1
10.0	1.4	1.6	1.7	1.8	1.9	1.9
12.0	1.1	1.3	1.5	1.5	1.6	1.6

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Production Area; Pine Bluff Arsenal.
Location: T5S, R10W, section 11; Jefferson County, Arkansas.
Unit: Production Area #3 - 70 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

First call the base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834 to report an escape. Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

None; Charles Becker informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure

oak-pine litter	9	100% - 70 acres	flat - none	sheltered

Fire Unit Narrative Description:

This rectangular unit comprises the eastern portion of the forest between Production Area #2 and Production Area #3. The unit is surrounded by roads on three sides with storage facilities within the unit to the north and south. The facilities area surrounded by mown rights-of-way. Ignition will likely be along mown area – forest interface as the rights-of-way are unlikely to burn. The west fire line is located along a ditch (which may or may not have water in it) that separates the burn unit from a recently thinned pine savanna (FM2 with slash). In several areas equipment is stored outside various building, including fiberglass tanks at the southeast corner. Power poles and phone boxes are scattered along the north, east, and south firelines. A raised steam line with many wooden supports runs along the west fire line. All firelines are accessible to the pumper or ATV. It is recommended that the pumper remain on the paved surfaces. Under wet conditions the pumper could get bogged down along the east fireline.

Oak-pine/litter: Most of the unit is covered by oak-pine/leaf litter (FM9). Where pine needles predominate this area will burn on the hot side of FM9. The ground cover is mostly oak leaves, pine needles, and non-continuous grass 20" tall. Pine needle draped vine tangles and large snags are extant. At the edges shrubs and herbaceous vegetation is thicker and often draped with pine needles.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological Stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
65%-85% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.

midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		225° - 315°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

FM9 (100%-70 ac.)	
Maximum behavior	
headfire flame length (ft)	6.5
backfire flame length (ft)	1.0
hf rate of spread (ch/hr)	44.0
bf rate of spread (ch/hr)	1.0
Minimum behavior	
headfire flame length (ft)	1.3
backfire flame length (ft)	0.5
hf rate of spread (ch/hr)	2.0
bf rate of spread (ch/hr)	0.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire along the interface between the mown area and forested section of the unit. The backfire will move into the unit through pine and oak leaf litter at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in FM9 and to ignite a continuous line in disturbed areas. Ten feet of blackline is adequate in FM9.

Ignition will continue along flanking lines. Fire should pull into the unit with 2' – 5' flame lengths in FM9. Smoke can be expected to be heavy due to deep duff and litter accumulations.

The fire will be rung as soon as the flanking fires have moved in 15' or more. In FM9 headfire will move at a moderate pace under dry conditions, interior ignition can be used to speed burnout. Flame lengths in FM9 will be 5' – 7'. The fire is likely to be continuous, stopping only at low wet areas and the ravines. Spotting from torching vine ladders could extend out 30' or more, a careful watch of burning debris along the firelines is warranted.

For interior ignition 1 or 2 igniters will move into the unit in a prearranged plan. It could take up to 1 hour to ring the unit and 2 hours to ignite the interior. All igniters must be familiar with the unit before ignition begins.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

<u>2 mile screen:</u>
Missouri-Pacific railroad - 0.25 miles west.
Industrial Park - 0.25 miles south.
Town of White Hall - 1.0 miles west.
Highway 365 - 1.5 miles west.
City of Pine Bluff - 2.0 miles south.
Highway 270 - 2.0 miles south

<u>5 mile screen:</u>
Interstate 540 - 3 miles south and west.

Built-up area of Pine Bluff - 3.5 miles southeast.
Residential areas - 4.0 miles.
Highway 104 - 5 miles west.
Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. In previous burns the smoke has set off alarms in the Production Area nearby. Built-up areas to the south and west, including major highways, could be impacted during days with poor dispersal conditions. Under category 2 or 5 days winds from the south or west would disperse smoke over the base and Arkansas River.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC

ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 60 minutes.
Interior ignition: 60 minutes.
Spreading fire: 90 minutes.
Mop-up: 120-180 minutes

Total duration: 4 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The north, south, and west firelines are paved roads with 10'-wide mown rights-of-way. The east fireline is a 16'-wide mown and raked handline. All culverts need to be checked for continuos fuels and woody debris deposited by beaver. All lines are ATV and pumper accessible. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. In FM9 stripping will likely be needed to secure the blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM9 is adequate. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. Interior ignition will be used to speed burnout.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be available for patrol along the downwind road. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to possible spotting near buildings, equipment, or into the mown rights-of-way.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the east into the pine savanna may require assistance from the Base Fire Department. Call the pumper for assistance. Any fire that ignites equipment or building requires the assistance of the Base Fire Department.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of large pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Large snags, downed trees, slash piles, alligators, and cottonmouths are extant in the unit. Care must be taken along the paved road (north line) as it has been obscured with smoke in previous burns and is frequently traveled at certain times of the day. Various explosive and toxic materials are stored in the buildings.

Mop-up:

Mop-up smoldering material within 20' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____

signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____

signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____

signature and date

PBA – Production Area Units

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

THE NATURE CONSERVANCY
CONTROLLED BURN PRESCRIPTION

1. LOCATION

Site: Pine Bluff Arsenal; Pine Savanna Restoration Area.
Location: T4S, R10W, section 33; Jefferson County, Arkansas.
Unit: Tulley Lake Unit - 15 acres.
Ownership: Department of Defense; TNC - burn contract.
Update: August 2001; Douglas Zollner and Scott Simon.

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone)

To report an escape, first call the Base Fire Department at (870) 540-3500, then the Arkansas Forestry Commission at (870) 468-8834. Jefferson County uses 911 for all emergency responses (to call an ambulance). A mobile phone is staged with the vehicles.

Law: Base Security (870) 540-3505.
Fire: Base Fire Department (870) 540-3500.
Medical: Base Health Clinic (870) 540-3409.
Attorney: South-central Division Lawyer (210) 224-8774.

3. PERMITS AND OFFICIAL NOTIFICATIONS

Prescribed Burn/Air Quality Notification: Yes; Arkansas Forestry Commission; Central Dispatch (501) 332-2000.

Other notification required? Yes; Verbal notification morning of burn:

Charles Becker; (870) 540-2834.
Base Security; (870) 540-3499.
Base Fire Department; (870) 540-3500.
Jefferson County Dispatch; (870) 541-5300 ask if they will notify the Jefferson County Sheriff and White Hall Police Department; (870) 247-1414.
Mayor of White Hall; (870) 247-2399.
Pine Bluff Fire Department; (870) 543-5150.

4. NEIGHBOR NOTIFICATION:

Colonel's House adjacent morning of burn.
Residential area along McCoy Road west of unit.
Charles Becker (Natural Resources Specialist) informs Base Personnel.

5. UNIT DESCRIPTION

vegetation types	fuel models	% of unit – acres	aspect - % slope	exposure
pine-oak/litter	9	100% - 15 acres	southeast – 1%	sheltered

Fire Unit Narrative Description:

The triangular Tulley Lake Unit comprises a pine-dominated upland just south of Tulley Lake, which forms the North fire line. The unit slopes toward Tulley Lake with the high point at the southwest corner. A 25'-wide paved road forms the south fire line. The west fireline is through FM9 adjacent to the Base Commanders House. All adjacent fuels are FM9. The south fireline is accessible to the pumper. The west fire line is ATV accessible.

Pine-oak/litter: Most of the unit is covered by pines and pine needle litter (FM9). This area will burn on the hot side of FM9. The ground cover is mostly pine needles; sparse shrubs and sprouts, pine regeneration, and non-continuous grass 20" tall is extant. Pine needle draped vine tangles and large snags are extant, as well as some ice damaged areas from the Winter/2001 ice storm. At the edges of the unit shrubs and herbaceous vegetation is thicker and often draped with pine needles.

6. PRESCRIBED BURN RATIONALE

Type of burn: Ecological stewardship

Site Fire Management Goals: The restoration and maintenance of a diverse herbaceous layer in all plant communities represented at PBA. The restoration of a more open, large tree-grass structure in the designated old growth areas across forest types. The maintenance and enhancement of fire-dependent rare species populations. Long-term reduction and maintenance of fuels loads for a fire safe landscape.

Specific Burn Unit Objectives:
75%-95% unit coverage.
substrate burn severity class = 1.0 – 3.0.
understory burn severity class = 1.0 – 3.0.
overstory char height class = 0.5 – 1.5.
overstory char degree = 0.5 – 1.5.

midstory scorch height = 1.0 – 3.5.
overstory scorch percent class = 0.5 – 2.0.
overstory scorch height class = 0.5 – 1.5.

7. FUEL AND WEATHER PRESCRIPTION

Source of weather: National Weather Service (501) 834-0308.

Web Sites:
http://www.srh.noaa.gov/ftproot/lzk/html/wx2.html (NWS).
http://www.srh.noaa.gov/ftproot/lzk/html/forest2.html (Forestry forecast, KB-index, 10 hr fuels).
http://www.forestry.state.ar.us/burnbans.html (County burn bans).

Required parameters:	**Maximum**	**Minimum**	**Preferred**
wind direction:	any		270° - 90°
mid-flame windspeed	12 mph	2 mph	8 mph
inferred 1-hour fuel moisture	12%	4%	6%
inferred 10-hour fuel moisture	14%	7%	10%
atmospheric mixing height:	5	2	AFC category days*
Guidance parameters:			
air temperature	85° F	35F°	
relative humidity:	60%	25%	
20' windspeed	18 mph	5 mph	

Notes: * ventilation rate 2000-16,000 = mixing height x transport windspeed.

8. ACCEPTABLE FIRE BEHAVIOR Fuel Model (% area)

FM9 (100%-15 ac.)	
Maximum behavior	
headfire flame length (ft)	6.5
backfire flame length (ft)	1.0
hf rate of spread (ch/hr)	44.0
bf rate of spread (ch/hr)	1.0
Minimum behavior	
headfire flame length (ft)	1.3
backfire flame length (ft)	0.5
hf rate of spread (ch/hr)	2.0
bf rate of spread (ch/hr)	0.0

9. FIRE BEHAVIOR NARRATIVE

Describe desired fire behavior. (How will fire behavior be manipulated to achieve management and control objective?)

A ring fire technique with interior ignition will be used. The fire will begin at the downwind fireline with igniters moving in opposite directions igniting backfire. The backfire will move into the unit through pine needles and grass at a slow rate with 1' to 3' flame lengths. Downed woody debris may become engaged in some instances. Stripping may be needed to secure an adequate blackline in disturbed areas. Ten feet of blackline is adequate. Note that with a south wind the fire can be allowed to burn into Tulley Lake without a backfire.

Ignition will continue along flanking lines. Fire should pull into the unit with 3' – 5' flame lengths. Torching of vine ladders can be expected. Downed woody debris will become engaged during dry conditions. Smoke production can be expected to be heavy.

The fire will be rung as soon as the flanking fires have moved in 10' or more. Flame lengths in FM9 will be 7' - 8' with sporadic torching of vine ladders. The fire is likely to be continuous, stopping only at low wet areas. Spotting from torching vine ladders could extend out 30' or more, a careful watch of burning debris along the firelines is warranted.

10. SMOKE MANAGEMENT PLAN

Smoke screening procedure completed? Yes

List smoke sensitive areas:

Built up areas of the base are adjacent including base housing and well traveled roads.

Highway 365; 1 mile west.
Highway 104; 2.0 miles west
City of White Hall; 2.5 miles south.
Highway 256; 2.5 miles south
National Center for Toxicology Research; 3.0 miles north.
I-530; 3 miles west.
Highway 65B; 4.5 miles southeast

Describe desirable smoke behavior and smoke management actions:

Arkansas Forestry Commission categories 2 - 5 allow for good lift and dispersal of smoke during daylight hours. This is a small unit and although smoke production will be heavy it will also be brief. Under good lift and dispersal conditions (category 3 or 4) any wind direction is acceptable. A south wind most desirable for this unit but no wind directions are excluded. Smoke ahead signs will be put in place before the burn and McCoy Road will be monitored for smoke impacts.

11. CREW ORGANIZATION

Qualified fire leader: Yes
Crew number: 6

12. EQUIPMENT

Required items:

Pumper onsite: Yes
First aid kit: Yes
Two-way radios: 4
Weather kit: Yes
Protective clothing: Yes
Fire shelters: No.

Justifications for exemption:

Fire shelters are not required. This unit is ignited from the black or along gravel or dirt roads utilizing a ring fire technique by personnel carrying waterpacks. Fuels are either grass or too dense for shelter deployment.

Equipment	Number	Source
waterpacks	6	TNC
5 gallon waterjugs	8	TNC
fire rakes	8	TNC
leaf blower	1	TNC
drip torches	4	TNC
fuel cans	3	TNC
pulaski	2	TNC
chainsaw	2	TNC
ATV w/water	1	TNC

13. BURN DURATION

Baseline preparation: 45 minutes.
Spreading fire w/ Interior ignition: 45 minutes.
Mop-up: 60 minutes.

Total duration: 2 – 3 hours.

14. MANAGING THE FIRE (describe the following)

Firebreak preparation:

The west fireline is a 16'-wide, ATV-accessible, mown and raked handline through FM9 and adjacent to base housing. The south fireline is a 25'-wide paved road. The north fire line is Tulley Lake. Snags near the firelines will be removed or raked around. Power poles and phone boxes will be mown and raked around in a 10' diameter circle.

Firing techniques:

Onsite weather will be taken and a test fire set to check fire and smoke behavior. If conditions are satisfactory, ignition will continue along the downwind fireline. Stripping will likely be needed to form a secure blackline. The backfire will be allowed to burn in to form a secure black line, 10' in FM9 is adequate. Ignition will then continue around the flanks in opposite directions. When the flanks are secure a headfire will be ignited to ring the unit. If necessary, interior ignition will be used to speed burnout. With a south wind no backfire is needed along Tulley Lake.

Crew communication: via two-way radios

Holding:

The pumper with a radio will be patrol along the downwind road, especially near base housing. Crew will patrol firelines with backpack pumps and rakes. An ATV with water will be available for patrol. Special attention will be paid to adjacent base housing.

Contingencies:

Minor escapes and spot fires will be treated by direct attack by the appropriate crew. Spot fires and escapes in FM8 and FM9 are controllable by raking and blowing in narrow firelines. Rates of spread are usually slow. A major escape to the south or west might impact housing areas and will require assistance from the Base Fire Department.

Crew hazards:

Pine needle draped vines and shrubs along the firelines could cause jackpotting. Vines often grow into the crowns of pine trees. Crew should be ready for sharp flare-ups. The drainages have vine tangles in places and seepage areas that are mucky. Snags, downed trees, ice damaged trees and debris, and cottonmouths are extant in the unit.

Mop-up:

Mop-up smoldering material within 20' of the firelines. Extinguish any burning snags that threaten the fire lines. The pumper can be used to reduce burning snags or downed woody debris if necessary. Plenty of water is available nearby.

Public relations:

Public relations are being handled by Mr. Charles Becker, Base Environmental Coordinator, as needed.

Follow-up assignments:

A fire summary report will be completed by the fire leader. ARFO stewardship staff will remain with the unit through the following morning. ARFO stewardship staff will carry out monitoring tasks.

15. APPROVALS

Fire Planners:

Douglas Zollner/Dir. Cons. Sci. _____
signature and date

Reviewer:

Scott Simon/Dir. Stewardship _____
signature and date

Fire Manager:

Scott Simon/Dir. Stewardship _____
signature and date

PBA – Tulley Lake Unit

HEADFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	8.	14.	23.	33.	44.
6.0	3.	6.	12.	19.	27.	37.
8.0	2.	5.	10.	16.	23.	32.
10.0	2.	5.	9.	15.	21.	29.
12.0	2.	5.	8.	13.	19.	26.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	13.	36.	71.	118.	176.	244.
6.0	11.	32.	63.	104.	156.	216.
8.0	10.	29.	58.	96.	143.	199.
10.0	9.	26.	52.	86.	128.	178.
12.0	7.	21.	42.	69.	103.	143.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	5.	13.	26.	42.	61.	84.
6.0	4.	11.	22.	36.	53.	72.
8.0	4.	10.	20.	32.	47.	65.
10.0	3.	9.	18.	29.	43.	59.
12.0	3.	8.	15.	25.	36.	50.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	23.	58.	108.	172.	248.	337.
6.0	17.	42.	79.	126.	183.	248.
8.0	14.	34.	64.	102.	147.	200.
10.0	12.	30.	55.	88.	128.	173.
12.0	11.	27.	50.	80.	115.	156.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	122.	346.	690.	1144.	1704.	2366.
6.0	101.	288.	575.	953.	1420.	1971.
8.0	91.	258.	514.	852.	1270.	1763.
10.0	77.	219.	436.	723.	1077.	1495.
12.0	52.	149.	297.	492.	733.	1018.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.9	2.9	3.9	4.8	5.7	6.5
6.0	1.7	2.5	3.4	4.2	4.9	5.7
8.0	1.5	2.3	3.0	3.8	4.5	5.1
10.0	1.4	2.1	2.9	3.5	4.2	4.8
12.0	1.3	2.0	2.7	3.4	4.0	4.6

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	4.1	6.6	9.1	11.5	13.8	16.0
6.0	3.8	6.1	8.4	10.6	12.7	14.8
8.0	3.6	5.8	7.9	10.0	12.0	14.0
10.0	3.3	5.4	7.4	9.3	11.2	13.0
12.0	2.8	4.5	6.2	7.8	9.4	10.9

BACKFIRE

DIRECT
1--TWO FUEL MODEL CONCEPT - 80% 9 -- HARDWOOD LITTER
20% 2 -- TIMBER (GRASS AND UNDERSTORY)
2--1-HR FUEL MOISTURE, % -- 4.0 6.0 8.0 10.0 12.0
3--10-HR FUEL MOISTURE, % - 7.0
4--100-HR FUEL MOISTURE, % 8.0
5--LIVE HERBACEOUS MOIS, % 30.0
7--MIDFLAME WINDSPEED, MI/H 2.0 4.0 6.0 8.0 10.0 12.0
8--TERRAIN SLOPE, % ------- 5.0
9--DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE
FROM UPHILL
10--DIRECTION OF SPREAD ---- 180.0
CALCULATIONS
DEGREES CLOCKWISE
FROM UPHILL

FUEL MODEL 9 (80%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	0.	1.	1.	1.	1.	1.
6.0	0.	0.	1.	1.	1.	1.
8.0	0.	0.	0.	0.	0.	1.
10.0	0.	0.	0.	0.	0.	0.
12.0	0.	0.	0.	0.	0.	0.

FUEL MODEL 2 (20%)

RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	2.	3.	3.	3.	4.	4.
6.0	2.	2.	3.	3.	3.	3.
8.0	1.	2.	3.	3.	3.	3.
10.0	1.	2.	2.	3.	3.	3.
12.0	1.	2.	2.	2.	2.	2.

FUEL MODEL 9 (80%) FUEL MODEL 2 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.	1.	1.	1.	1.	1.
6.0	1.	1.	1.	1.	1.	1.
8.0	1.	1.	1.	1.	1.	1.
10.0	0.	1.	1.	1.	1.	1.
12.0	0.	1.	1.	1.	1.	1.

FUEL MODEL 9 (80%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	3.	4.	5.	5.	5.	5.
6.0	2.	3.	3.	4.	4.	4.
8.0	2.	2.	3.	3.	3.	3.
10.0	2.	2.	2.	3.	3.	3.
12.0	2.	2.	2.	2.	2.	3.

FUEL MODEL 2 (20%)

FIRELINE INTENSITY, BTU/FT/S (V4.4)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 2.0	4.0	6.0	8.0	10.0	12.0
4.0	18.	25.	30.	34.	36.	38.
6.0	15.	21.	25.	28.	30.	32.
8.0	13.	18.	22.	25.	27.	28.
10.0	11.	16.	19.	21.	23.	24.
12.0	8.	11.	13.	14.	16.	16.

FUEL MODEL 9 (80%)

FLAME LENGTH, FT (V4.4)						
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	.8	.9	.9	.9	1.0	1.0
6.0	.7	.7	.8	.8	.8	.9
8.0	.6	.7	.7	.7	.8	.8
10.0	.6	.6	.7	.7	.7	.7
12.0	.5	.6	.6	.7	.7	.7

FUEL MODEL 2 (20%)

FLAME LENGTH, FT (V4.4)						
1-HR MOIS (%)	MIDFLAME WIND, MI/H					
	2.0	4.0	6.0	8.0	10.0	12.0
4.0	1.7	2.0	2.2	2.3	2.3	2.4
6.0	1.5	1.8	2.0	2.1	2.2	2.2
8.0	1.5	1.7	1.9	2.0	2.0	2.1
10.0	1.4	1.6	1.7	1.8	1.9	1.9
12.0	1.1	1.3	1.5	1.5	1.6	1.6